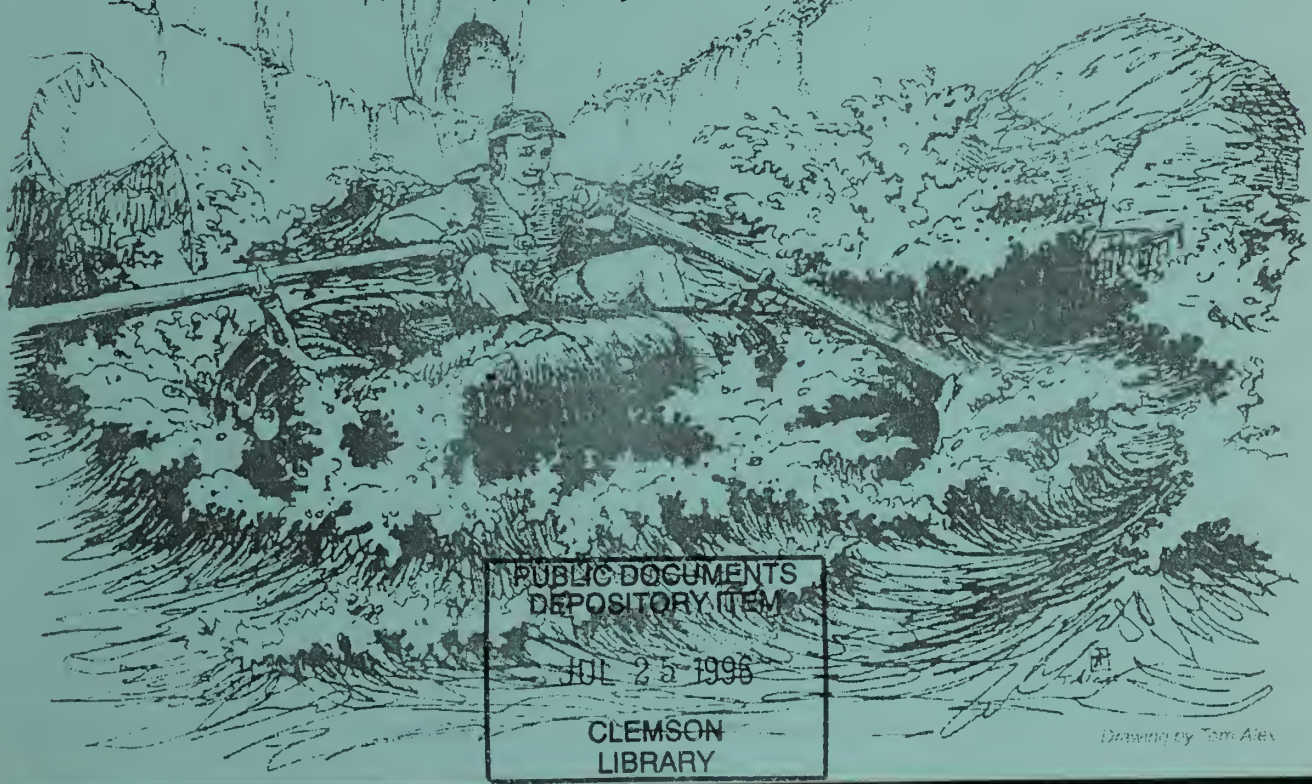
I 29.2: B 48/9

Recreational River Use Management Plan

Big Bend National Park

June, 1996



FEDERAL PUBLICATION

PUBLIC DOCUMENTS DEPOSITORY ITEM
JUL 25 1996
CLEMSON LIBRARY

96-0280-P

TABLE OF CONTENTS

LIST OF MAPS

LIST OF FIGURES

LIST OF APPENDICES

I. Preface

This Recreational River Use Management Plan (Plan) serves as the primary reference for management of recreational use on the Rio Grande within Big Bend National Park (Park). The Plan serves as an amendment to the Backcountry Management Plan (National Park Service 1995) and meets the objectives stated therein. This Plan will be reviewed at least every five years and revised as necessary.

Chapters I through VII provide a general overview of the Rio Grande corridor, including a description of the environmental setting and current recreational use trends. Goals and objectives of the Plan are outlined here.

Chapter VIII and IX review the planning process for this document and outline specific issues that require management decisions. The six issues addressed in this Plan include zoning, motor use, fishing, access, human waste, and recreational use limits. Chapter IX also highlights the current situation. Issues beyond the scope of this document include trespass livestock, commercial hauling, smuggling, air and water quality, water quantity, cultural resource protection, etc. Laws, regulations, and policies shape various external influences and fundamental practices. Other Park management plans address these issues.

Chapter X details the Plan's recommendations. These proposed actions will govern the specific issues of zoning, motor use, fishing, access, human waste, and recreational use limits. This chapter compares and contrasts the recommendations against the current situation.

Chapter XII contains an environmental assessment of the Plan. Under the National Environmental Policy Act (NEPA), significant management actions, such as the six issues addressed by this Plan, must be considered in terms of their benefits, their costs, and their impacts upon a variety of resources and values. The Plan also considers reasonable alternatives to the actions, including a No-Action alternative. The No-Action alternative leaves existing conditions, policies, or actions in place.

II. Introduction

The Rio Grande originates from springs and snow melts high in the southern Rocky Mountains of Colorado. As it flows southward, its waters are diverted for flood control, irrigation, power generation, recreation, and municipal uses in New Mexico and Texas. By the time the Rio Grande leaves El Paso, so much water has been diverted that the riverbed between El Paso and Presidio often lies dry. Depending upon annual precipitation, 69 to 86 percent of the water in the Rio Grande downstream from Presidio flows from the Mexican Rio Conchos.

The Rio Conchos, originates in the Sierra Madres of western Chihuahua, Mexico and joins the Rio Grande at Ojinaga, Chihuahua and Presidio, Texas. A smaller percentage of the Rio Conchos' water is currently diverted for agricultural and municipal purposes than from the Rio Grande.

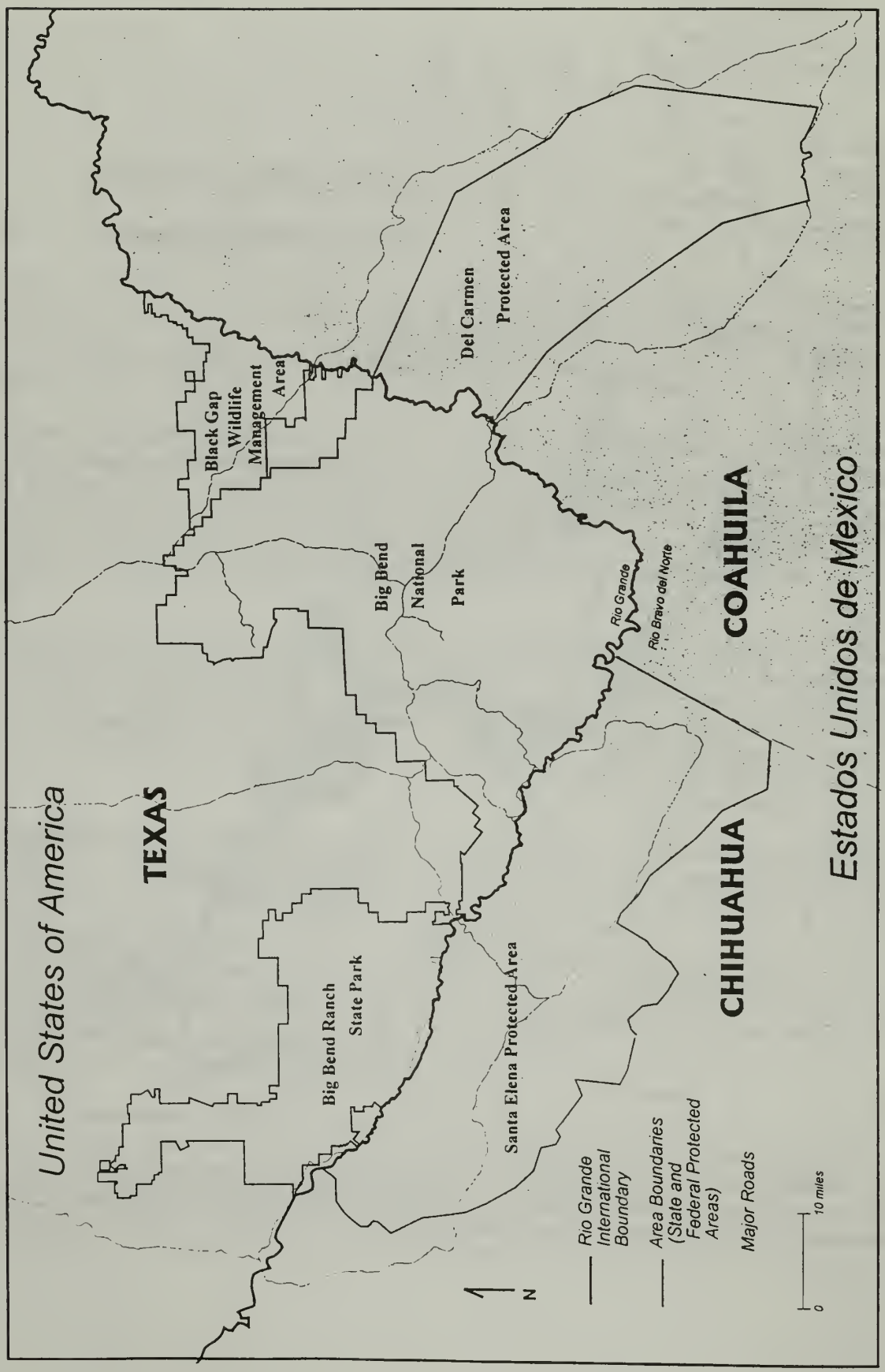
For more than 1,000 miles, the Rio Grande forms the international boundary between Mexico and the United States; Big Bend National Park administers approximately one-quarter of that boundary. Within the 118 twisting miles that also define the Park's southern boundary, the river's southeasterly flow changes abruptly to the northeast and forms the "big bend" of the Rio Grande.

Because the Rio Grande serves as an international boundary, the Park faces unusual constraints when administering and enforcing park rules, regulations, and policies. The Park has jurisdiction only to the center of the deepest river channel; the rest of the river lies within the Republic of Mexico. South of the border, people call the Rio Grande by its Mexican name, Rio Bravo del Norte.

The Park encompasses more than 800,000 acres in the southern tip of Brewster County, Texas. It has national significance as the largest protected area of the Chihuahuan Desert topography and ecology in the United States. Few areas exceed the Park's value for the protection and study of geologic and paleontologic resources. Cretaceous and Tertiary fossil organisms exist in variety and abundance. Archeologists have discovered artifacts estimated to be 9,000 years old, and historic buildings and landscapes offer graphic illustration of life along the international border at the turn of the century.

South of the river lie the Mexican states of Chihuahua and Coahuila and the new reserves of the Maderas del Carmen Reserve and the Cañon de Santa Eleña Reserve. The Black Gap Wildlife Management Area, administered by Texas Parks and Wildlife Department (TPWD), partially forms the eastern park boundary. The Southern Investors Service Company (Lajitas) and Terlingua

Map 1. Regional Map depicting the Big Bend's location in relation to Texas, New Mexico, Colorado, and the drainages of the Rio Grande, Rio Conchos, and Pecos River.



Map 2. Big Bend National Park area map, including the state-administered areas and Mexican reserves.

Ranch developments border the park on the west. Big Bend Ranch State Park, also administered by TPWD, lies farther west. Private ranch lands comprise the Park's remaining boundary.

In 1978, Congress designated a 196-mile portion of the Rio Grande from the Chihuahua/Coahuila state line in Mexico to the Terrell/Val Verde county line in Texas as part of the National Wild and Scenic Rivers System. The upper 69-mile section of this 196-mile corridor lies within the Park. The Wild and Scenic Rivers Act of 1968 directs that designated rivers "...be preserved in free-flowing condition, and that they and their immediate environments be protected for the benefit and enjoyment of present and future generations." The National Park Service (Service) administers this 196-mile section as the Rio Grande Wild and Scenic River.

In 1976, the United Nations Education Science and Conservation Organization's Man and the Biosphere (MAB) Program recognized the Park. Because of its international significance, the Park was designated an International Biosphere Reserve.

The Rio Grande corridor and its associated natural systems, cultural treasures, and recreational opportunities comprise prime visitor attractions at the Park. Because of the public's interest in the Park and in river management, the Service is striving to ensure that the public receives information and is included in efforts to protect and manage resources.

This Plan addresses issues associated with the Rio Grande's 118 miles that lie within the national park, including the 69-mile section designated as wild and scenic. The portion of the Rio Grande Wild and Scenic River downstream from the Park (the "Lower Canyons") exhibits distinct issues and will be addressed in a future River Use Management Plan specific to that section.

III. Goals and Objectives of the Plan

A. Goals

- provide a long-term plan for recreational river use activities within the Park.
- preserve the environmental processes and the natural and cultural resources of the river corridor by avoiding, mitigating, or eliminating unacceptable environmental impacts resulting from recreational river uses.
- furnish a diversity of quality river experiences while maintaining desired visitor expectations.

B. Objectives

- provide different types of sociological experiences for river users.
- distribute use between different user groups.
- afford access to the river corridor for recreational users of most ages, abilities, and physical limitations.
- establish motorized watercraft guidelines.
- define procedures to handle human waste generated by recreational users.
- designate parameters for fishing within the river corridor.
- initiate a public information and interpretation program to educate recreational river users about related aspects of the Plan.
- base recreational river use management policies upon sound data and encourage continued inventory and monitoring of natural, cultural, and recreational resources.

IV. Legislation

A. Enabling Legislation

An Act of the 74th Congress (49 Stat. 393) authorized the establishment of the Park on June 20, 1935, and provided that

> "lands...as necessary for recreational park purposes...are hereby established, dedicated, and set apart as a public park for the benefit and enjoyment of the people."

The Act stipulated that provisions of the Service's Organic Act of August 25, 1916, (39 Stat. 535), as amended, apply

> "...to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

All planning, development, and management decisions and actions must conform to provisions of the Park's enabling legislation, the Service's Organic Act, and legislation relating to cession of exclusive jurisdiction by the State of Texas to the United States (Deed of Cession signed by Governor Stevenson on December 30, 1943, and Deed of Cession signed by Governor Clements on September 22, 1980).

The amendment of November 10, 1978, (P.L. 95-625) to the National Wild and Scenic Rivers System Act (P.L. 90-542) established the Rio Grande Wild and Scenic River to include:

> "The segment on the United States side of the river from river mile 842.3* above Mariscal Canyon downstream to river mile 651.1 at the Terrell-Val Verde County line: to be administered by the Secretary of the Interior."

*The International Boundary and Water Commission officially revised these mileages to 853.2 and 657.5. These new mileages are used in this Plan.

B. Other Legislation

Management decisions and actions must also comply with

- the Natural Environmental Policy Act of 1969;
- the Geothermal Steam Act of 1970;
- the General Authorities Act (16 USC 181 1c) of 1970;
- the Clean Air Act of 1972 as amended;
- the Clean Water Act of 1972 as amended;
- the Endangered Species Act of 1973 as amended;
- the Resource Conservation and Recovery Act of 1978;
- the Redwood National Park Expansion Act (PL 95-250, 92 Stat. 163) 1978;
- Executive Order 11988, "Floodplain Management"
- Executive Order 11990, "Protection of Wetlands" of 1978;
- the Antiquities Act of 1906;
- the Historic Sites Act of 1935;
- the National Historic Preservation Act of 1966 and its compliance procedures, Executive Order 11593 of 1971;
- the Archeological and Historic Data Preservation Act of 1974;
- the Archeological Resources Protection Act of 1979 as amended;
- the Native American Graves Protection and Repatriation Act of 1990; and
- the American with Disabilities Act of 1992

C. Other considerations

- the Code of Federal Regulations, Part 36;
- the Big Bend National Park Compendium, 1994;
- the Big Bend National Park Statement for Management, 1992;
- National Park Service Management Policies (1988)
- the Park's General Management Plan (GMP), 1980
- the Wilderness Act of 1964

NOTE: While the river does not lie within proposed or recommended wilderness, some portions of the floodplain do.

V. General Environment and Social Setting

A. General Environmental Setting

The Park exhibits dramatic contrasts; its climate may be characterized as one of extremes. Dry, hot late spring and early summer days often exceed 100 degrees in the lower elevations. Winters are normally mild throughout the Park, but sub-freezing temperatures occasionally occur.

Because of the great range in altitude from approximately 1,800 feet along the river to 7,800 feet in the Chisos Mountains, a wide variation in available moisture and in temperature exists throughout the park. These variations contribute to an exceptional diversity in plant and animal habitats.

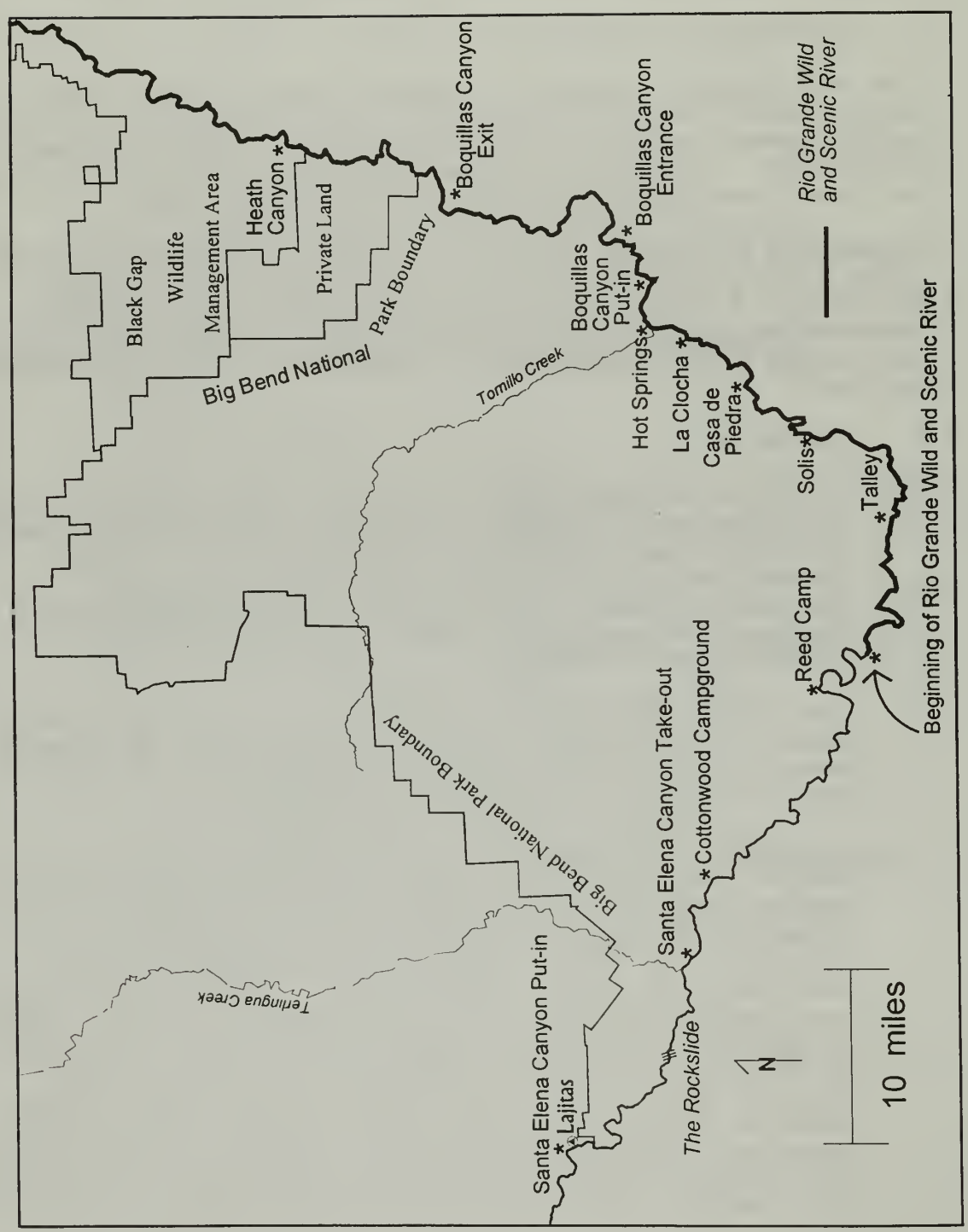
B. The River

1. The Canyons - The 118 river miles, which form the southern park boundary, include the spectacular canyons of Santa Elena, Mariscal, and Boquillas. The Rio Grande, meandering through this portion of the Chihuahuan Desert, has cut deep canyons with nearly vertical walls through three uplifts comprised primarily of limestone.

The Rio Grande canyons' creation occurred relatively recently in geologic terms. A change in the climate some 3 million years ago at the beginning of the Ice Age affected the face of the landscape.

Some geologists speculate that Mexico's Rio Conchos formed the canyons by eroding away many layers of rock and cutting into the harder, faulted rocks that now comprise the canyons. Evidence indicates that the ancestral Rio Grande flowed into a basin in Mexico southwest of present-day El Paso. About 60,000 years ago the Rio Conchos tributary captured the main branch of the Rio Grande and redirected its flow to the Gulf of Mexico. The much enlarged river, despite its greater power, could flow nowhere but in the already existing channels. The greater erosive power of the combined rivers accelerated the canyon cutting process and resulted in the magnificent canyons of the present Rio Grande. (National Park Service, 1983)

a. Santa Elena Canyon - The Rio Grande severs the Sierra Ponce to form Santa Elena Canyon, the westernmost of the Park's canyons. For seven miles the river flows between sheer limestone



Map 3. The Rio Grande.

walls that rise as much as 1,500 feet. The Rock Slide rapid, located within two miles of the canyon entrance, challenges rafters and canoeists and at certain water levels becomes a Class IV rapid. The 20-mile Santa Elena Canyon trip begins outside the Park on private property in Lajitas and ends within the Park one mile downstream from the mouth of Santa Elena Canyon.

b. Mariscal Canyon - The Rio Grande begins its "big bend" to the northeast within the walls of Mariscal Canyon. Here the river cuts through Mariscal Mountain to form a six-mile long canyon with walls rising more than 1,400 feet. Two rapids generally are designated as Class II or III. The 10-mile Mariscal Canyon trip begins at Talley and ends at Solis Landing.

c. Boquillas Canyon - The river leaves the Park through Boquillas Canyon, the longest canyon trip within the Park. In places, walls rise 1,200 feet above the river as it slices through the Sierra del Carmen. The 33-mile Boquillas Canyon trip begins at Rio Grande Village in the Park and ends at Heath Canyon outside Park boundaries. Rapids rate no higher than Class II.

2. Inter-Canyons - Throughout the desert open areas, the highly productive Rio Grande riparian zone includes various plant and animal species and significant cultural resources. This vegetative belt pushes out across the desert along creeks and arroyos. The river zone remains agriculturally important to Mexican and Texas neighbors adjacent to the Park. This section offers spectacular vistas of the Chisos Mountains, the Sierra Quamada, Sierra del Carmen, Sierra Ponce and other mountains in the Park and Mexico. It also offers great potential for solitude in an undeveloped setting.

C. Social Setting

The Park lies in south Brewster County, one of the most sparsely populated areas of the country. Brewster County consists of 6,204 square miles and has a population of approximately 13,000 people. Most of the population resides in two towns: Marathon and Alpine, which lie 69 and 100 miles, respectively, to the north and northwest of Park headquarters. The western gateway communities of Study Butte, Terlingua, and Lajitas have experienced growth in recent years but still lag behind Marathon and Alpine in terms of numbers.

Bus and rail lines serve Alpine, but bus lines provide the only commercial transportation to Marathon. The nearest major airport with regularly scheduled commercial flights is the Midland-Odessa Airport, 220 miles from park headquarters. A small commuter airline provides service to Alpine, 100 miles from Park headquarters.

Visitation to the Park has steadily grown in recent years. The river zone has become a primary recreational area for visitors attracted to its scenic and recreational qualities. Approximately three percent of park visitors participate in either a commercial or private river trip. (Figure 1) (Appendix 1)

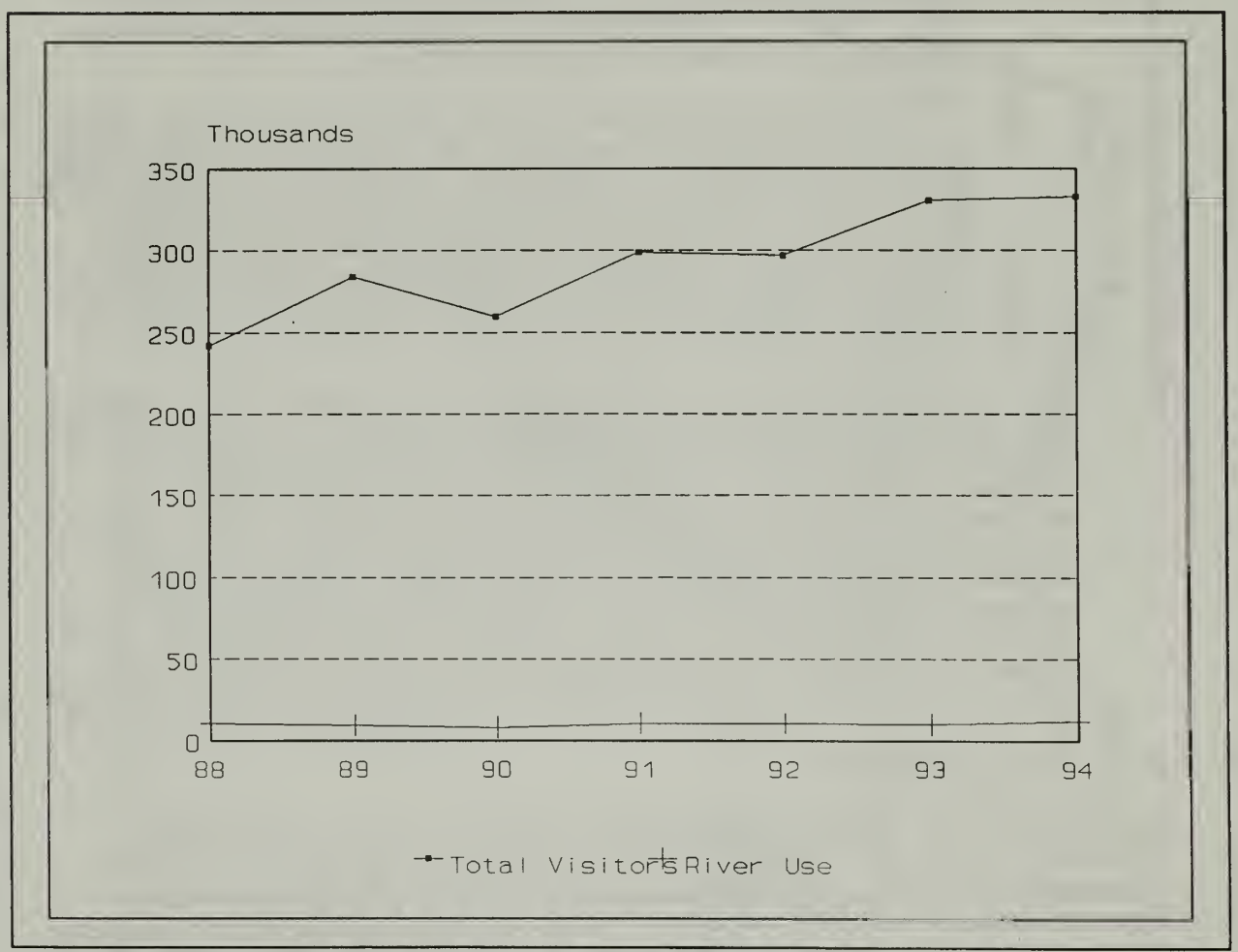


Figure 1: Total number of river users compared to total park visitation.

The Mexican states of Chihuahua and Coahuila lie immediately south of the Park. Farming, ranching, and some mining adjacent to the river sustain the small Mexican communities of Paso Lajitas, Santa Elena, San Vicente, Boquillas, and La Linda.

Current users of the Rio Grande corridor include private and commercial recreational boaters and fishermen, non-boating riverside campers, day use recreationists, and neighboring livestock and agricultural operations.

D. Natural Resources

1. Wildlife - The riparian corridor, where vegetative growth and an ample water supply provide a more diverse and hospitable environment than the surrounding desert, attracts many wildlife species.

Numerous avian migrants use the river corridor as an important resting point along their spring and fall migration routes. While many bird species only pass through the area, common resident species seen or heard along the river include the yellow-breasted chat, black phoebe, whitewing dove, canyon wren, and roadrunner. The endangered peregrine falcon nests high on canyon cliffs. Ravens, turkey vultures, and a variety of raptors commonly soar overhead.

Because of human and livestock influences, larger mammals seldom inhabit the river corridors. Collared peccaries, mule deer, bobcat, and mountain lion make occasional use of the inter-canyon regions. Small mammals are more abundant; striped skunks, ringtails, and rodents commonly occur. Rare visitors include coatimundi; observations of black bears are increasing.

2. Aquatic Habitat - A diverse array of water sources comprise the aquatic environments of the Rio Grande corridor. In addition to the river, tributary sources include permanent streams or creeks and warm and cool springs. Tinajas, stone basins filled by rainfall runoff, may be found in side canyons.

The cumulative effects of human activity over the years have degraded the Rio Grande aquatic environment. Heavy silt loads, exacerbated by livestock grazing of sparse desert vegetation, impair productivity of fish and invertebrate eggs laid upon the river substrate.

Upstream impoundments and diversions have altered natural river flow quantities and patterns. Downstream

dams have caused sturgeon and freshwater eel, both dependent upon migration to the sea, to vanish from the Big Bend area.

Fertilizers and pesticides from upstream agricultural activities and sewage from upstream towns and villages in both the United States and Mexico cause rapid algal growth. Algae consume much of the dissolved oxygen needed to support other aquatic life forms.

Forty-six known species of fish inhabit the Big Bend area; 34 are native, and 12 have been introduced. In addition to the endangered Gambusia gaigei, eight others are listed on either Federal or state threatened or endangered lists. Six have been extirpated, primarily due to the effects of dams, habitat modification, and introduced competitor species.

The Park has little information about the aquatic invertebrates of the river corridor. Basic inventories have identified a broad spectrum of insect larvae and several mollusk species, including some which could be greatly affected by further degradation of water quality. The Park currently has no monitoring programs in place to detect changes in aquatic invertebrate populations.

3. Riparian Habitat - The Rio Grande riparian zone varies from small intra-canyon banks to floodplains more than one-half mile wide. It supports a diverse habitat heavily influenced by flooding, soil transport, and increased moisture availability.

The introduced, but widespread, bermuda grass dominates many sections of riverbank. Throughout the river corridor, extensive stands of introduced giant reed and native common reed line the river bank. The mesquite and saltbush send roots deep into the soil for moisture and are characteristic of drier areas of the floodplain.

Early biological surveys indicated that lance-leaf cottonwoods and willow were common, but since European colonization of the area, their seedlings rarely survived grazing effects. Prior to the Park's establishment, farmers tilled and cleared most larger sections of floodplain and grazed livestock in the river corridor. Trees, such as huisache and willow, now occur near the river.

The non-native tamarisk competes more successfully for water and nutrients than the native species. Other opportunistic species, such as mesquite and creosote bush, continue to dominate many acres.

Ecologists have long recognized the Rio Grande riparian habitat as the most heavily damaged ecological zone of the Park. Introduced species and the continued effects of trespass livestock are primarily responsible for its unnatural condition. Grazing denudes grasses and shrubs; trampling destroys vegetation and allows soil erosion; and fecal waste contaminates water sources. Non-native species out compete many native species and alter the nature of the river banks.

In spite of the many alterations, which human influences have created, the riparian zone remains a lifeline of water with abundant plant and animal species and a more hospitable habitat than the adjacent desert.

4. Threatened and Endangered Species - Two of the Park's four endangered animal species occur within the river corridor: the Peregrine falcon (Falco peregrinus) and the Big Bend gambusia (Gambusia gaigei). Two threatened cactus, bunched cory cactus (Coryphantha ramillosa) and Chisos Mountains hedgehog cactus (Echinocereus chisoensis), occur within the river corridor in a few locations. Several species of Category II plants (proposed for listing but more research is needed) occur in the river corridor. The Mexican black bear is a state-listed species. Hypothetical species include the southwest flycatcher and jaguarundi.

Past and current human activities continue to affect the survival of Big Bend's endangered species. The peregrine falcon is recovering, but still experiences eggshell thinning due to pesticides. Flooding of the Rio Grande periodically threatens one of the three Big Bend gambusia habitats. Fishermen, who release bait or caught fish in the gambusia's habitat, could significantly affect that habitat. The small colonies of threatened bunched cory cactus and Chisos Mountain hedgehog cactus are at risk from collecting or development disturbances.

5. Water Flow Quantities - The Rio Grande, the second longest river in the United States, is no longer a naturally flowing river. Extensive networks of diversions and dams control flows on both the Rio

Grande and the Rio Conchos. Neither river is currently managed to provide an in-stream flow needed to sustain riparian habitat and for recreational purposes.

The Rio Grande Compact Commission (Commission), a three state entity representing Colorado, New Mexico, and Texas, manages water flows of the Rio Grande from its headwaters to Fort Quitman, which lies downstream of El Paso. Established in 1938, the Commission manages private water rights, some of which date to the 1800s, and apportions the Rio Grande's flow, including a share to Mexico at El Paso.

The bi-national International Boundary and Water Commission (IBWC) manages the water in the Rio Grande from Fort Quitman to the Gulf of Mexico. The treaty of 1944 between the United States and Mexico requires that at least one-third of the combined annual flow volumes from the six Mexican rivers, which flow into the Rio Grande, belong to the United States. The Rio Conchos is the largest of the six Mexican tributaries. The treaty also states that these flows must total at least 350,000 acre-feet annually, based upon a five-year moving mean average. The treaty does not, however, establish release schedules for these six rivers. Thus flows passing through the park vary considerably over time due to the unpredictability of releases from the impoundments.

In summer 1995, surplus waters were released from the New Mexico reservoirs. The deteriorated river channel between Fort Quitman and Presidio caused more than 65 percent of the water that reached Fort Quitman to spill from the river's channel and to form shallow lakes before reaching Presidio.

The IBWC has long considered a project to stabilize the Rio Grande's riverbed downstream from Ft. Quitman to Presidio. The project would clearly delineate the official boundary and would ensure that more of the Colorado and New Mexico waters reached the lower Rio Grande. Lack of funding and support has prevented the IBWC from implementing this much needed project.

The IBWC monitors the 1944 treaty allocations through a system of gauging stations on the Rio Grande and Rio Conchos. Some of these stations have been monitored since 1889. The Johnson Ranch gauging station near Castolon has measured flows since 1936.

Historically, flows passing through the park have varied considerably. The highest daily flow of the Rio Grande above the Rio Conchos confluence near Presidio and Ojinaga was 13,700 cubic feet per second (cfs) on June 14, 1905; it is now frequently dry. Since 1896, the greatest flood of record on the Rio Conchos had an estimated momentary flow of 162,094 cfs and occurred on September 11, 1904.

Within the Park, the Johnson's Ranch gauging station recorded several days in 1953, 1955, 1957, and 1958 when the riverbed was dry with zero cfs being measured. Only 27.5 cfs were measured on September 9, 1968. The maximum daily flow of 65,332 cfs occurred on October 1, 1978.

A number of small thermal seeps and springs and a few larger ones along the Rio Grande contribute modest amounts to the river's flow within the Park. Many of these go dry during extended periods of drought. The characteristic semi-arid climate of the region makes the Rio Grande one of the most sensitive rivers to climate change within the United.

6. Water Quality - Over the last 15 years, development has flourished along the Mexico and United States border, and the population of the border region has doubled to more than six million people. The growth is partially fueled by more than 1,400 maquiladora (product assembly) plants. With that growth comes increased potential for water quality degradation and toxic chemical contamination.

Historically, many communities on both sides of the border have had inadequate water and sewage treatment facilities. One of the side agreements to the North American Free Trade Agreement addresses environmental concerns. The bi-national Border Environment Coordinating Committee has been established to deal with those infrastructure needs.

In 1993, American Rivers, the principal river conservation organization in the United States, listed the Rio Grande/Rio Conchos as the most endangered river in America. It stated that this river system was "presenting the greatest human health threat of any river in America due to the headwaters-to-mouth degradation and to pollution by newly developed industrial plants along the Mexican side of the border."

Three studies associated with the water quality in the river have been conducted since 1987. In 1987, researchers from Memphis State University sampled river water near Rio Grande Village. Although they identified a non-pathogenic amoebae, Vahlkamphia, they found neither the pathogenic Naegleria fowleri nor Acanthamoeba culbertsoni.

This study does not conclusively prove that the pathogenic amoebae were not present or that they could not emigrate or multiply in detectable numbers. This non-detection merely suggested that the amoebae were not present in sufficient numbers to cause human infection at the time of sampling.

Two fatalities, which occurred near El Paso and Laredo in 1994, were attributed to amoebic infection associated with swimming in the effluent of settling and stagnant ponds. To cause encephalitis, the amoebae must be taken deeply into the sinus cavities until they reach the point where the nerves from the nose enter the brain.

According to microbiologists, only repeated diving into stagnant polluted water and having the water forced up the nasal passage with a great deal of pressure is likely to expose a river user to the amoeba. They claim that the potential of a river user being affected by the Naegleria fowleri should be considered extremely unlikely given the circumstances cited previously. Acanthamoeba culbertsoni enters the body through cuts and scratches and is even more uncommon than Naegleria fowleri. It also occurs in stagnant water with a very high organic content. (Detterline, 1987)

In May 1993, the University of Texas at El Paso conducted a water quality study of the river between Lajitas and La Linda. Ten sampling sites along the river and other backcountry water sources provided a snapshot view of the water quality.

The study showed that most pollution in the Rio Grande within the park occurred from general runoff that picks up pollutants as it travels. No iron or mercury were found, and the levels of cadmium, lead, and arsenic were below this study's detection limits.

Researchers did, however, detect high levels of fecal coliform bacteria in this snapshot view. These bacteria originate from man, cattle, or other warm-blooded mammals that live near the river. These

specific organisms are not usually harmful but may indicate the possible presence of pathogens. (McKay, 1994)

Through the IBWC, Mexico and the United States conducted a study of toxic contaminants in the Rio Grande from El Paso to Brownsville in 1992 and 1993. The study involved a one-time sampling of 19 mainstream and 26 tributaries sites. Each country conducted the sampling and analysis according to their respective analytical capabilities.

In the Park, researchers sampled two sites: the mouth of Santa Elena Canyon and Terlingua Creek before it flows into the Rio Grande. The study found no specific readings at the park stations that would raise concern.

Outside the Park, the study found few potential toxic chemical-related problems in the mainstream of the Rio Grande. If toxic impacts occurred at mainstream sites, the effects were relatively slight. Researchers observed no instances of severe impairment to the aquatic plant and animals. Potential problems were more prevalent in tributaries because some tributaries transport wastewater in relatively undiluted form.

No short-term risks were indicated for the 24 sites for which edible fish tissue analysis was conducted, including the mouth of Santa Elena Canyon and Terlingua Creek. Data from fish fillet samples were evaluated for potential human health risks using U.S. Food and Drug Administration tolerance levels; none were exceeded.

Outside the park, the study revealed that at 17 of 22 sites, slight human health risks could result from regular, long-term consumption of untreated water and/or fish. For risks to occur, however, fish would have to be consumed on a daily basis over a period of many years. Significant risks were observed for the other five sites, but all were sewage effluent-dominated tributaries. (IBWC, 1994)

A second phase of this study is underway to better define the degree of impact, assess temporal variation, and further identify sources of toxic chemicals. The Park sites are included in this second phase.

Although several state and Federal agencies, including park staff, periodically monitor the quality of the river's water, the monitoring is not done frequently

enough to give managers a clear understanding of the Rio Grande's water quality. Most studies provide only a snapshot view of the river. The Texas Natural Resources Conservation Commission (TNRCC) fosters the Texas Watch Program, organized groups of volunteers who collect and analyze water samples for five basic quality parameters on a quarterly basis. The Big Bend River Watchers formed in August 1994 to conduct this sampling and analysis from Presidio through Boquillas Canyon.

Although the Service cannot directly affect the quantity and quality of the river upstream, the Service will continue to monitor water flows and quality and participate in the Texas Watch program. The Service has also begun working with the Rio Grande Compact Commission and the IBWC to explore long-term strategies to ensure minimum flow levels and treaty compliance.

E. Cultural Resources

Cultural resources in the Park range from the Paleo-Indian period 10,500 years ago through historic Native American groups such as the Chisos, Mescalero Apache, and Comanche. More recently, Spanish, Mexican, and American settlers ranched and mined in the area. Many archeological sites may yield significant scientific evidence.

Throughout the prehistoric period, humans found shelter and maintained open campsites throughout the Park. The archeological record reveals an Archaic desert culture whose inhabitants developed a nomadic hunting and gathering lifestyle that remained virtually unchanged for several thousand years.

Past human inhabitants used all portions of the park, but were particularly attracted to the river corridor during the most recent prehistory. Sites containing limited quantities of ceramic artifacts suggest that some later indigenous peoples had a semi-sedentary lifestyle and practiced limited agriculture along the river.

The historic cultural landscape centers upon various subsistence or commercial land uses. The riparian and tributary environments were used for subsistence and irrigation farming. Transportation networks, irrigation structures, simple domestic residences and outbuildings, and planed and terraced farm land lining the stream banks characterize these landscapes.

The park presently preserves ten National Register historic properties, four of which, the Sublette Farm, the Daniels Farm, the Castolon Historic District and the Hot Springs District, lie within the river corridor. The Barker Lodge was listed on the National Register on October 20, 1989, and the Daniel Farm House is currently under nomination.

Because current park visitors are also attracted to water sources, damage to sites occur through artifact collection, digging, and insensitive use. Erosion, trampling by trespass livestock, and invading tamarisk growth cause deterioration of prehistoric and historic sites concentrated along the river.

VI. Special Considerations

A. International Aspects

The entire southern park boundary lies along the middle of the deepest channel of the Rio Grande; the Mexican states of Chihuahua and Coahuila lie immediately to the south. Any activity taking place south of the international boundary occurs in the Republic of Mexico and is subject to Mexican laws.

1. Mexican Reserves - In November 1994, former Mexican President Carlos Salinas de Gortari designated two wildlife reserves, which total approximately 1.2 million acres, in the northern Chihuahuan desert. President Salinas identified more than 500,000 acres of the Maderas del Carmen section of the Sierra del Carmen range in Coahuila as the Maderas del Carmen Reserve. He designated nearly 700,000 acres south of Santa Elena Canyon as the Cañon de Santa Elena Reserve. These reserves will sustain wildlife and natural features. The creation of these reserves raises possibilities for developing joint river management strategies with national and state governments in Mexico.

2. Smuggling - Smuggling activities into and from Mexico occasionally disturb and intimidate visitors engaged in normal sightseeing and camping activities along the river. Commercial haulers attempt to avoid Mexican import taxes by transporting electronics, food, and other commercial goods across the border at unofficial crossings in the Park.

Occasionally, Mexican livestock has been smuggled into the United States through the Park to avoid U.S. Department of Agricultural (USDA) quarantine restrictions and fees. Livestock in the United States

is occasionally rustled and then driven through the Park and across the river. Interdiction efforts for all these activities may affect Park visitors.

3. Mexican Land Use - As they float the river, visitors may catch glimpses of a variety of Mexican land uses. Ranching, small-scale farming, and limited mining of silver, fluorspar, and mercury provide the primary methods of subsistence. Other activities include harvesting candelilla and processing it into wax, collecting cacti for sale in the United States, and trapping fur-bearing animals.

4. Border Crossings - Three Class B border crossings exist in the park: Santa Elena, San Vicente, and Boquillas. These crossings involve no vehicle crossings, commercial travel, or support facilities. Mexican citizens travelling into the United States must get a permiso if they plan to travel 25 miles beyond the international border or spend more than 72 hours in the United States. U.S. citizens may travel up to 25 miles into Mexico before they need authorization.

B. Water Rights

The IBWC enforces international rights and obligations under numerous boundary and water treaties and related agreements with Mexico. Refer to the Water Quantity section (V.D.5.) for specific information about treaty obligations.

Water rights on Federally-owned property of the Park belong exclusively to the United States under Texas State Law (priority date 1927). This accords the United States rights to both percolating (underground) sources and springs originating from percolating water.

Two appropriative water rights, consolidated in 1989 through the Texas Water Commission, now Texas Natural Resources Conservation Commission, from existing successor-in-interest rights, exist. For water diverted from the Rio Grande at Castolon and Rio Grande Village, these annual rights include 1,000 acre feet of irrigation water and 530 acre feet for municipal purposes.

C. Cooperative Agreements

Memoranda of Understanding exist between the Service and the following entities:

- the Environmental Protection Agency (EPA) regarding the Clean Water Act;

- the USGS to coordinate the long-term water quality needs of units of the Service with the USGS National Water Quality Assessment Program;

- Sul Ross University of the purposes of fostering scientific research.

VII. Historical Use and Management along the River Corridor and Use Trends

A. Historical Use

Although recreational river running of the Rio Grande began during this century, archeologists date use of the river corridor back thousands of years. The archeological record reveals that prehistoric Indian groups used the riparian and tributary environments.

During their colonial period, the Spanish viewed the Rio Grande area as a natural defensive barrier between Spanish settlements south of the river and Apache and Comanche raiders to the north. The Spanish limited their activities to infrequent explorations, military expeditions, minor settlements, and the establishment of the presidio at San Vicente and San Carlos. By the time that Mexico had attained its independence from Spain in 1821, the main Indian raiding trails passed near the Rio Grande canyons with one branch of the Great Comanche Trail crossing the river near Mariscal and the other near Lajitas.

Hispanic settlement and economic development of the area began in the early 1800's as people discovered that the "despoblado," the uninhabited land, could provide a living; Anglo settlement began to occur in the 1880's. Ranching spread into the Rio Grande area as did irrigated farming. Subsistence living along the river involved fishing, trapping, and hunting. Other historical uses of the river corridor included settlements, commercial operations such as wax making, fur trading, and the Hot Springs resort. The U.S. military and the Texas Rangers had chapters of their colorful histories associated with the river corridor of the Big Bend.

Mining, although not directly identified with the Rio Grande corridor, did have a direct impact upon the river environment. Early reports and diaries portrayed the river corridor as lined with cottonwood and willow trees. By the early 1900's, however, most of the forests had been harvested for mining operations. Reports show that by 1930, coal was mined near Terlingua to provide fuel for the quicksilver furnaces after the companies had depleted the wood supply. (Langford, 1952; Gomez, 1990)

Topographic engineers during mid 1859-1860 attempted to fulfill the mandate of the Treaty of Guadalupe Hidalgo by surveying the international boundary between Mexico and the United States. Dr. Robert T. Hill successfully journeyed along the Rio Grande from Presidio to the mouth of the Pecos

River near Langtry in 1899. He was guided by James MacMahon, a trapper and only person to have previously floated the river through the canyon section successfully. (Hill, 1901)

The river corridor and its spectacular canyons supplied the scenic initiative for this area to be considered as a tourist attraction. In 1933, supporters of the park idea successfully lobbied the Texas Legislature for the creation of the Texas Canyons State Park. Later that same year, the public lands were enlarged and the name was changed to Big Bend State Park, later to be recommended as a national park.

When the Federal Government passed legislation authorizing the Park in 1935, the Service sent groups of scientists and technicians into the area to explore its features and locate possible wildlife refuges. One such exploration was the widely publicized Webb Expedition through Santa Elena Canyon during May 1937.

With the establishment of the Park in 1944 and its associated publicity and subsequent development, genuine recreational use of the river corridor began. Visitor-related recreational use of riverside camping, fishing, and floating began with modest numbers of participants and has steadily increased over the past decades. River running began on a full-time commercial basis in the 1970's. Other recreational river uses, including birdwatching, photography, day hiking, and enjoyment of solitude, have also increased in recent years.

B. Management

Most of the area encompassing the river corridor is classified and managed by the Park as a "Natural Zone." According to the Park's General Management Plan (GMP), these zones are managed "as a natural zone where natural resources and processes remain largely unaltered by human activity, except for approved development essential to management, use, and appreciation of the park." The GMP further identifies the three river canyons as subzones to be managed as "Outstanding Natural Feature Subzones" to provide for visitor enjoyment without impairing their quality, intrinsic value, or uniqueness.

In 1978, the Wild and Scenic Rivers Act was amended to include a portion of the Rio Grande. The Rio Grande Wild and Scenic River General Management Plan (1981) classifies the areas from Talley to Solis and from the entrance of Boquillas Canyon to its exit as "wild" according to the definitions provided by the Wild and Scenic Rivers Act.

That plan's management objectives are "to preserve the river in the natural, free-flowing character and purpose for which the area was established, and permit historical uses." The management plan defines historical uses and includes watering of livestock, fishing, and floating. The plan further states that "Rafts, canoes, kayaks, and motor boats will be allowed on the river."

The Service requires all operators of private and commercial watercrafts, except for persons day-fishing downstream from the park boundary, to obtain a free Backcountry Use Permit from any visitor center before launching. Self-permitting stations exist at the Barton Warnock Center in Lajitas for Santa Elena trips and at the Stillwell Store for Boquillas Canyon trips. General regulations outline the Service's requirements for all river users.

Only during the late 1970's did the Park begin to require written authorization in the form of Special Use Permits to commercial river outfitters. The Service converted those permits to Commercial Use Licenses (CUL) in 1981. In 1995, authorizations took the form of Incidental Business Permits, a type of Special Use Permit. An attachment to each commercial authorization defines additional requirements for commercial users.

C. Use Trends

A study conducted by Texas A&M University in 1993 examined use of the Rio Grande corridor. Researchers examined data from permits issued from 1983 through 1992. Additional data for 1993 and 1994 were determined by examining permits and monthly use reports.

The study revealed that river use peaked in 1985. The general drop in the total number of permits since 1985 appears to be attributed to a drop in private permits. More than 1650 private permits were issued in 1985 compared to 412 in 1990, 772 during 1992, 529 in 1993, and 633 in 1994.

The number of commercial river permits has remained relatively stable between 1984 and 1992, and fluctuated between 900 and 700 annually. Commercial use reached a high of 1113 permits issued in 1994. (Figure 2) (Appendix 2)

Trends in the number of all permits issued are not consistent. In the 10 years of the study and the two additional years of data gleaned from monthly use statistics, the slope of the line representing all permits reversed itself four times. The line representing all private permits reversed itself six times, and the line

representing all commercial permits reversed itself five times. Reversals of all three lines did not necessarily occur during the same years. (Figure 3)

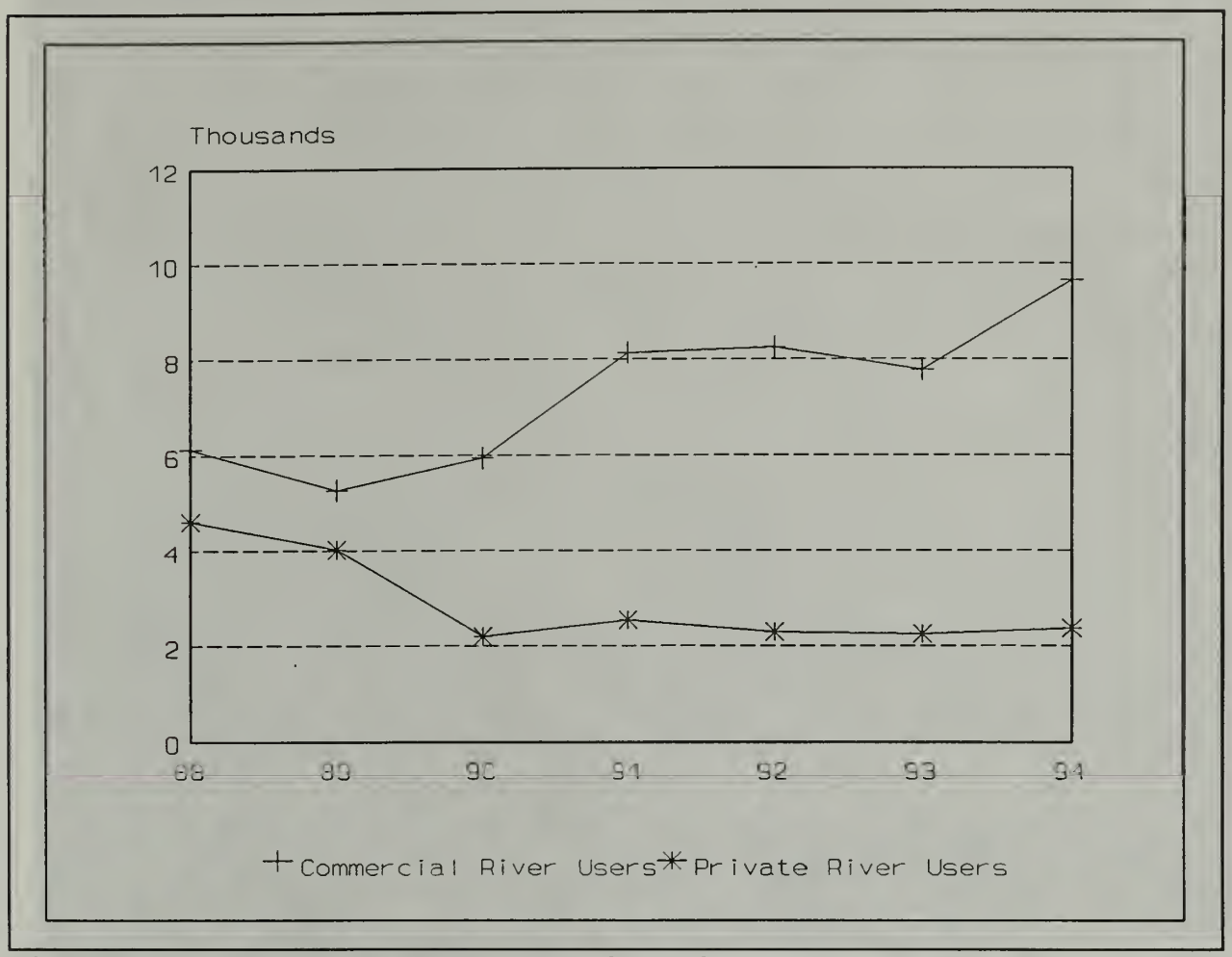


Figure 2: Trend of Total Commercial River Users Compared to Total Number of Private River Users

According to the study, private permittees consistently have more boats per permit than commercial outfitters, but commercial outfitters consistently have more people per boat than private permittees.

1. Santa Elena Canyon - During the ten years examined, Santa Elena had four times as many permits as either Mariscal or Boquillas Canyons. Trend data indicate that in 1992 ninety percent of all of the commercial permits were for Santa Elena Canyon use. In contrast, Santa Elena received only 32 percent of the private use.

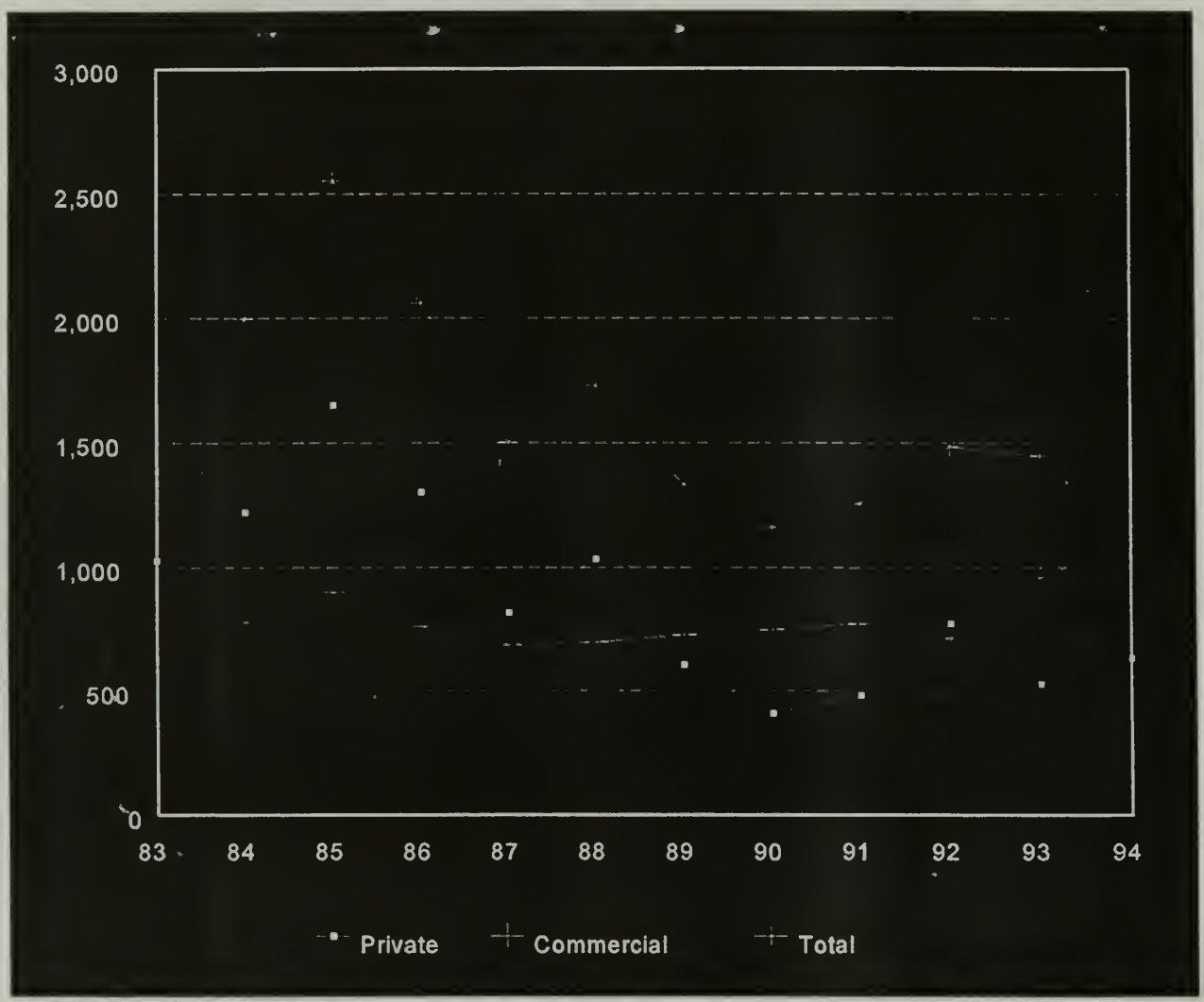


Figure 3: Trends by Private, Commercial, and Total Permits

Since 1983, the proportion of commercial permits issued for day trips in Santa Elena increased from 10 percent in 1983 to just over 50 percent in 1992. In addition, the general drop in private use is reflected in the decrease in private permits issued for Santa Elena during the late 1980's.

Data indicate that Santa Elena Canyon provides a distinctly different river recreation experience from the other river segments. Santa Elena trends include:

- a higher number of rafters as compared to other types of water craft, such as kayaks, canoes, or motorboats

- a higher number of rafters on day-trips as compared to overnight trips, and
- a higher number of commercial trips as compared to private use.

Easier access, less time required for the entire trip, and greater logistical convenience contribute to the high commercial use of Santa Elena Canyon rather than the other canyons. By contrast, private users revealed that seeking a challenge was the primary motivational factor for their use of Santa Elena Canyon. (Figure 4)

2. Mariscal Canyon - Prior to 1990, approximately the same number of combined private and commercial permits were issued for Mariscal and Boquillas Canyons. (Figure 5) Since 1990, however, the use of Mariscal Canyon has dropped, possibly because of the length and condition of the four-wheel drive access roads. Severe budget and personnel constraints have forced the Service to maintain the River Road and access roads to Talley and Solis only one or two times a year. Prior to 1990, the Service maintained the road four to six times a year.

Because Mariscal Canyon is the narrowest of the three canyons, it has the deepest channel during low water years. Thus, commercial use tends to shift to Mariscal Canyon when users cannot run Santa Elena Canyon in a day. In 1993, a low water year, the 148 commercial trips through Mariscal almost doubled from 78 trips in 1992.

During 1994, another low water year, commercial trips primarily used Colorado Canyon, which is upstream from the Park boundary, rather than Santa Elena Canyon. The Colorado Canyon trip was a logistically simpler trip to run and road conditions were easier on equipment than the Mariscal trip. Low water conditions in both Santa Elena and Colorado canyons forced most commercial use once again to Mariscal Canyon during March and April of 1995. Road conditions took a heavy toll on the companies' equipment.

3. Boquillas Canyon - Use of the lengthy Boquillas Canyon has remained relatively stable. Solitude and a wilderness experience are primary motivating factors for using Boquillas Canyon.

Of the 17 commercial companies, 14 use Boquillas Canyon as compared to the 9 that use Santa Elena Canyon and 8 that use Mariscal Canyon. At least six of the

companies travel long distances to conduct less than five trips a year. So although Boquillas Canyon receives the lowest user numbers, more companies offer a Boquillas Canyon trip than a trip through Mariscal and Santa Elena. (Figure 4)

4. Inter-Canyons - The open river section between Mariscal and Boquillas Canyons has been popular and receives about the same amount of use as Boquillas Canyon. This use generally comes from private rather than commercial operators. In the low water spring of 1995, however, several companies offered a half-day float from the Santa Elena Canyon take-out to Cottonwood Campground. (Figure 4)

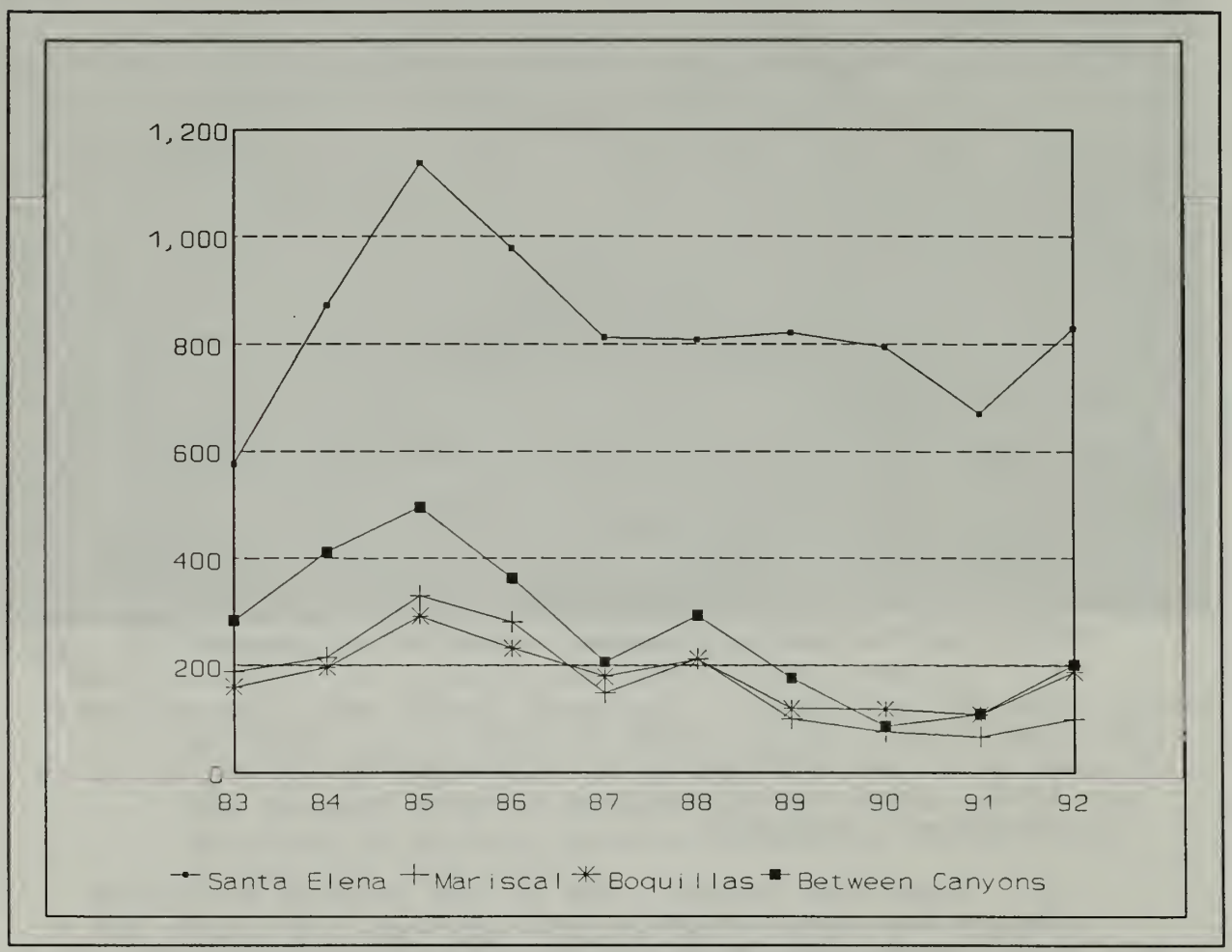


Figure 4: Permits issued for Santa Elena, Mariscal, Boquillas, and Inter-Canyon Sections

D. Quality of Experience - The Texas A&M researchers learned that experiencing solitude was a primary motivational factor for participating in a river trip. The majority of users indicated that solitude was very important to their trip. Of the groups queried, more private users or roadside campers sought solitude than the commercial patrons. Similarly, solitude was less important to Santa Elena Canyon users than to users of the other river segments. The highest percent of respondents, 84, listed solitude as important for Boquillas compared to 78 percent for Mariscal, 76 percent for the Inter-Canyons, and 71 percent for Santa Elena. (Stewart, 1993)

Private permittees seeking a challenge floated Santa Elena rather than the other segments of the river. The least important motivational factor for river use was fishing.

VIII. Public Involvement

On July 30, 1993, the Park invited the public to participate in a scoping process to determine the extent or range of issues to be addressed in the Plan. At least 118 press releases containing the invitation to participate in the scoping process were sent to interested parties. The park also issued a moratorium upon new, additional commercial river operations until the completion of the plan.

The park received 23 written responses. The most frequently addressed issues included management of human waste (18), solitude and wilderness experiences versus higher use levels (17), litter in the river corridor (16), access to river put-ins and take-outs (15), commercial and private use (15), extent of development at river put-ins and take-outs (14), motorized versus non-motorized watercraft (14), and use limits (14). Respondents also addressed issues such as fishing regulations (2), fishing methods (6), types and origin of bait (2), protection of the aquatic habitat (7), water quality (1), and safety of river runners (1).

IX. Management Issues

A. Management Issues Excluded from the Plan

Because this document only addresses recreational river use, various conditions associated with the Rio Grande corridor present management concerns beyond the scope of this document. Such issues include trespass livestock, commercial hauling, narcotics smuggling, illegal aliens, air and water quality, etc. Other Park planning documents thoroughly discuss these issues.

1. Trespass livestock - Domestic livestock that cross the river from Mexico and graze along the river corridor in the Park have severely impacted the river corridor. Barrenness and trails created by livestock have caused erosion and loss of riverbank and nearby desert topsoil. River users' enjoyment of trips has been impacted by camping in and floating through areas that are unsightly, eroded, and polluted with manure and urine. Additionally, cattle and horses occasionally enter and disturb occupied campsites.

The international border confounds the mitigation of trespass grazing along the Rio Grande. It is not feasible to fence the international boundary, as other boundaries of the park have been, due to public and international relations and the expense. Enforcement measures must be considered in light of their international nature.

The Service, USDA, and U.S. Border Patrol (USBP) conduct periodic trespass livestock round-ups. These enforcement efforts will continue. All livestock captured in the Park will be transferred to USDA for sale or disposal. Cooperative efforts with Mexican landowners are being made to improve range management along the river and to educate neighbors regarding park values.

2. International Border Activities - Smuggling activities occasionally occur in the river corridor, as described in section VI.A.2. Overflights by the USBP, U.S. Customs, and Service officials may disturb the wilderness experience of river recreationalists, but can be expected to continue. The Service is working with the other agencies to mitigate the noise impacts of these overflights.

Enforcement efforts have sharply curtailed the commercial hauling activities and forced operators to

use crossing points outside the park boundaries. Additional joint enforcement activities between the USBP and Service will continue.

Three Class B border crossings occur in the park: Santa Elena, San Vicente, and Boquillas. Park visitors, who wish to add a visit to a Mexican community to their Big Bend experience, use these low-water, row boat crossings. Mexican nationals and their families also use the crossings for many different reasons. The Park will continue to work with Immigration and Naturalization Service and the USBP to manage border crossing activities.

3. Water Quantity and Quality - Sections V.D.5. and V.D.6 describe the water quantity and quality in detail.

4. Air Quality - The Park experiences severely degraded air quality during much of the year. Research by the Service's Air Quality Division has identified the most serious contributing sources as coal-fired power plants, steel mills, metal smelters, and refineries in the vicinity of Rio Escondidos, Saltillo, Monterey and Monclova, Mexico; Texan and Mexican Gulf coast refineries; and local windblown soil.

Two coal-fired electric power stations, located in Rio Escondido, Coahuila approximately 25 miles south of Eagle Pass, Texas and 136 miles southeast of the Park threaten to further degrade air quality. Carbon I, built during the 1980's, has four, 300 megawatt units; Carbon II has four, 350 megawatt units. Neither the Carbon I nor Carbon II units have air pollution controls for sulfur dioxide or nitrogen oxides. Large amounts of sulfur and nitrogen oxides are emitted into the atmosphere. Park data indicate that visibility has decreased significantly from 1989 to 1993. With Carbon II coming on line, the potential exists for further degradation of Big Bend's air quality.

The Mexican and United States governments have established a binational technical work group to develop measures to preserve air quality and address air quality degradation, including visibility problems at the Park. The Service is represented on this work group. Air quality monitoring has been on-going in the Park since mid-1978 and will continue.

B. Management Issues Included in the Plan

This section provides current descriptions of the six recreational use-related issues that the Plan addresses.

1. Zoning - Although no formal management zones currently exist, use trends indicate that river recreationalists use different segments of the river to gain different types of experiences. Most users plan their trips around a particular river segment; only an extremely small percentage travel through two or more river segments on the same trip.

Santa Elena Canyon has become the most popular canyon for day trips. Commercial use has risen, and private use has decreased. The canyon is important to private users who hope to achieve a challenging experience. A lower percentage of Santa Elena Canyon users seek solitude and wilderness values than do the users of the other river segments. Also, a lower percentage of commercial users than private users seek solitude.

The location of and access to Mariscal Canyon present logistical challenges not experienced by users of the other canyon segments. These challenges probably combined to cause the decrease in recreational use since 1990. Mariscal's users fall in the middle of the range of those seeking a solitude and a wilderness experience compared to the other canyon segments.

Seeking solitude and a wilderness experience comprises the primary motivating factor for travelling through Boquillas Canyon. The characteristics of the canyon require that the vast majority of users spend several days on the river.

The Inter-Canyon segments are primarily associated with private use. Many users probably camp at the backcountry road campsites along the River Road. These segments are also associated with fishing and motor use and receive about the same amount of use as Boquillas and Mariscal canyons. Of the four sections, users of the Boquillas, Mariscal, and Inter-Canyon segments appear to be roughly equal with respect to seeking solitude and a wilderness experience. (Stewart, 1993)

2. Motor Use - Although both motorized and non-motor use occur within the Park, statistics show only a small percentage of permittees use motorized water craft. From 1990 to 1992, the Service issued 599 private river use permits. Of those, users with motorized crafts

received 7 percent or 41 permits: 10 in 1990, 7 in 1991, and 24 in 1992. None of the commercial companies offer river trips with motorized watercraft.

Of the 41 permits, 12 were issued for the Talley/Solis area, indicating probable use in Mariscal Canyon; 9 were issued for the Santa Elena Canyon exit, indicating probable use of Santa Elena Canyon; 5 for the Rio Grande Village area, indicating possible use in Boquillas Canyon; and 2 for Lajitas. Users also received permits for other areas such as San Vicente, Cottonwood, and backroad camps along the river road for the remaining 13 permits.

During these three years, all permits for motor use were issued during the months of June through November: 5 in June, 6 in July, 4 in August, 13 in September, 7 in October, and 6 in November. No permits for motor use were issued from December through May. The Service closed the canyon segments of the river to motor use between February 1 and July 15 to prevent disturbances to nesting peregrine falcons.

According to information gathered from backcountry use charts, interviews with permit-writing staff, and entry-exit data, the Service issued the majority of motorized use permits to individuals or groups interested in fishing rather than recreational boating activities along the river corridor. The Park does not have information about what percentage of motor users fail to get permits.

Extremes in high or low water levels impede or preclude hard-hull craft on the river. Limitation recommendations on hard-hull boat use through Class III rapids apply when river levels exceed 2000 cubic feet per second (cfs). Low water exposes rocks and other obstacles to motorized travel.

Access is currently provided at specific locations along the river corridor and varies from drive-in to carry-in.

Water quality research of the Rio Grande corridor through the Park has not examined the levels of contaminants in the river associated with motor use. Further investigations should determine such levels and their effect upon aquatic systems.

As stated earlier in Chapters VI, VII, and VIII, the expectation and experiencing of solitude are primary

motivational factors for individuals deciding to participate in a river trip. During the scoping process for this plan, one of the most frequent requests of respondents was for the Plan to protect opportunities for solitude.

The survey of 330 private permittees from March through December 1993 (Stewart, 1993) indicated that 67 percent reported seeing no motorized watercraft. However, of the 33 percent who did encounter motorized watercraft, 25 percent indicated that the encounter detracted from their experience.

3. Fishing - Recreational fishing has occurred throughout the history of the Park. Target fish include any of several species of catfish, primarily the flathead and channel catfish. Consumptive use of fish and taking of live bait comprise the sole exception to general Service policies which minimize human impacts on natural animal populations.

The recent river user survey (Stewart, 1993) indicated that a minority of river users, usually private parties, find fishing an important activity. Most camp at road-access campsites along the river and use motorboats to set and check lines.

Fishing methods include the fishing pole and line, rod-and-reel, throw lines (a line attached to the bank at one end), and trot lines (lines fixed to the bank at both ends). Occasionally users abandon lines and line markers, which remain as litter until removed by park staff or other floaters. Seining is allowed for capture of bait minnows. The Service prohibits jug fishing (floating plastic or metal bottles with a short line and hook attached), because jugs frequently become lost or entangled in riverside vegetation and constitute a highly visible form of trash.

The Service does not require a state or park permit for fishing. Users may fish at all times and places along the main river. Fishing is not allowed in tributary streams or at the warm springs and ponds near Rio Grande Village, which are home of the endangered Big Bend gambusia. The personal catch limit is 25 fish per day or in possession. To prevent the introduction of exotic species into the river environment, the Service prohibits the use of live bait other than locally caught minnows.

Records do not indicate how many visitors participate in fishing or how many fish are caught. Several fish surveys (Platania, 1990, 1994) and studies of toxics in fish (Irwin, 1988) represent the few data available regarding Big Bend fisheries. No research has assessed the impact of fishing or seining upon the aquatic environment. In recent years, increased river pollution has raised concern over whether fish tissue is safe for human consumption. The IBWC study published in 1994 indicated that slight human health risks could result from regular, long-term consumption of fish.

4. Access - Current access to the river is generally undeveloped. In two instances, landowners outside park boundaries have granted permission for boater access across their property. No formal agreement exists with either of the landowners. The National Parks and Conservation Association (NPCA) may arrange a land exchange with one owner to provide for public river access.

Developed access points at Lajitas, Santa Elena Take-out, Rio Grande Village, and Heath Canyon consist of dirt ramps to the water which receive minimum maintenance. Primitive access, defined as a dirt or paved road to the river's bank, exists at Talley, Solis, and Cottonwood Campground. Undeveloped access, consisting of a road to a point near the river and a route to the water for carry-in access, exists at Jewels Camp, Woodsons, Black Dike, Hot Springs, and La Clocha.

A variety of roads serve the various river access points, ranging from paved to those which require four-wheel drive, high-clearance vehicles. Four-wheel drive may be needed to access some put-in and take-out points during periods of wet weather.

Users may camp near most access points in frontcountry or backcountry campsites. Several areas, however, do not have campsites within one-eighth of a mile of the access point.

The Service presently provides restrooms and trash receptacles at or near the two developed access points of Santa Elena Take-out and Rio Grande Village. No facilities are provided at Lajitas or Heath Canyon, or at primitive or undeveloped access points within the park.

River dynamics make it difficult to provide permanent ramps into the water. Fiscal and manpower constraints, as well as the impacts to resources, also influence the development and maintenance of access points.

5. Human Waste - Over the years, incidents of improperly buried human feces and toilet paper trash in the vicinity of campsites have called attention to the issue of human waste carry-out. Popular campsites suffer from a surrounding ring of human waste litter. Burning toilet paper has led to wildland fires.

Commercial users have been voluntarily carrying out solid human waste for a number of years. Since 1994 all commercial river companies have been required to carry out all solid human waste for both day and overnight trips as a condition of their license. Private users have been encouraged to carry out solid human waste for several years, with mixed results.

Until recently, the standard method for carry out has involved the use of plastic bags. These bags, incompatible with septic systems and wastewater treatment plants, were ultimately disposed of in landfills. New regulations by the EPA now preclude their disposal in most landfills. Therefore, river users may no longer use plastic bags to carry out human waste. The Park presently provides for paper-bagged waste disposal at the Santa Elena Take-out.

Reusable toilet systems provide an alternative to systems dependent upon paper bags. In the past several years, a number of manufacturers have developed and are marketing toilet systems designed to be dumped at RV dump stations. These range from plastic to welded metal and cost from $60.00 to $500.00. Many are designed for large commercial groups on longer trips, but there are a few smaller, less-expensive options suitable for small parties and/or short trips. Several recreational vehicle campgrounds to the north and west of the park accept waste from boaters for a small fee. While the Park would like to provide for the disposal of human waste in locations that would serve all river users, present disposal systems do not lend themselves to the remoteness and lack of utilities and maintenance in the areas to be serviced. Additionally, Federal regulations limit development of structures in floodplains.

6. Recreational Use Limits - Respondents to the Texas A&M study indicated that they did not encounter social

problems resulting from the number of their encounters with other groups while on the river or in camp. (Stewart, 1993)

The study's findings show that peak use occurred in 1985 for Santa Elena, Boquillas and the inter-canyon sections and in 1986 for Mariscal. The use in each section then declined until 1991. Subsequently, the uses in all sections have increased. Evaluation of the 1993 use data show an even greater peak use in all sections of the River than in 1985, the former peak.

Santa Elena Canyon receives the greatest use by river runners because of the increased day use compared to overnight use which has occurred since 1985. Most of this day use is by the commercial companies in response to public demand and to maximize their operational efficiency.

The Service currently places no limit upon the number of parties which may launch each day in any of the segments of the river. But each commercial company may not start more than 30 passengers, not including guides, on a particular river segment.

Each private party which launches in any of the three canyon sections of the river may start a total of no more than 30 people each day. Private party launches in the inter-canyon segments of the river are limited to no more than 45 people each day. No limit on the number of private parties, which may launch each day, currently exists.

X. Proposed Action - The Plan

A. Use Issues

1. Zoning - Current and historic patterns of recreational use on the Rio Grande indicate that more than 95 percent of users treat the river as being comprised of different segments for recreational opportunities. Most use just one canyon or area of the river during a specific trip.

Collectively, these segments provide a diversity of recreational river opportunities. The social setting, number of encounters, expectations of encounters with other groups, perceptions of impacts, and the importance of solitude, level of challenge, and fishing use vary from segment to segment. Access to and from the river differ by segments, and the extent of other non-recreational uses (i.e., livestock grazing) may also vary. Finally, the presence of ranger patrols and enforcement personnel currently varies along river segments.

The Service proposes to manage the different river segments to perpetuate a variety of experiences, which will be provided for in threshold, primitive, and wild zones. Each zone will include one of the three major canyons.

a. The threshold zone will provide a quality backcountry experience characterized by higher use levels and a greater density of users. Because more people may use the threshold segments, users may experience more encounters with other groups and fewer opportunities for solitude. Thus, those seeking solitude and a wilderness experience will choose to use a different zone. The Service will not designate campsites. Due to the limited number of sites, several popular sites will receive most of the use. Because of more concentrated use, more impacts may occur to the riparian zone. Evidence of development may be more apparent.

Santa Elena Canyon lies outside the Wild and Scenic River designation. Data indicate that current use patterns of Santa Elena display characteristics associated with a threshold area.

Threshold segments will include:

- the western Park boundary to the Santa Elena Canyon Take-out;
- the Santa Elena Canyon Take-out to Cottonwood Campground;
- Cottonwood Campground to the old Reed Camp location;
- Solis to La Clocha; and
- La Clocha to Boquillas Canyon Entrance.

These segments total 67 miles or 58.8 percent of the 118-mile river corridor.

b. The primitive segments will provide a less crowded experience than the threshold zone with a lower density of users. Use levels will be moderate, and human activities will be minimal although noticeable. Users of the primitive zone will encounter fewer other groups and will experience more solitude than users of the threshold zone. All camping will be undesignated.

Mariscal Canyon lies within the Wild and Scenic River designation, which identifies it as a "wild" section. The segments are generally inaccessible except by trail or the access points, and shorelines remain essentially primitive. The primitive designation ensures that users of Mariscal Canyon will experience more solitude than the users of Santa Elena Canyon.

Primitive segments will include

- Reed Camp to Talley and
- Talley to Solis, which includes Mariscal Canyon.

The primitive segments comprise 23.8 percent of the river corridor or 28 miles.

c. The wild segment of the river will be characterized by the expectation of encountering few or no other parties. Users will experience few human influences. The wild zone will have the lowest density of users, which will ensure the greatest opportunity for solitude. All camping will be undesignated.

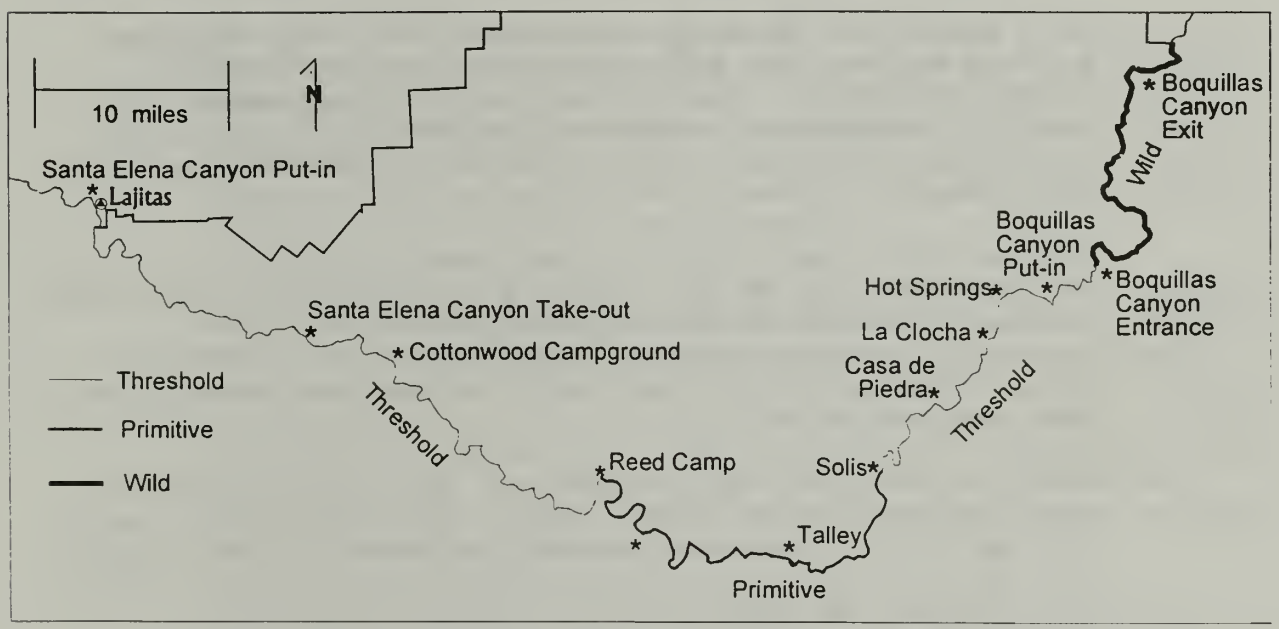
Boquillas Canyon also received a "wild" designation under the Wild and Scenic Rivers

legislation. The length of a Boquillas Canyon trip allows users to become immersed in a wilderness experience. Designation as the "wild" zone ensures that users of Boquillas Canyon will experience the least amount of intrusion from other groups and from development. Users will have the greatest opportunity to experience solitude. The segment is generally inaccessible except by trail; access points lie outside the wild zone. Shorelines remain essentially primitive.

The wild segment will extend from

- the entrance of Boquillas Canyon to the eastern boundary of the Park.

The wild segment comprises the smallest management unit of 17.5 percent or 20.6 miles.



Map 4. Proposed Zones.

2. Motorized Watercraft - Electric motor use may occur in the threshold segments of the river corridor, including Santa Elena Canyon throughout the entire year. Santa Elena Canyon will be closed to all other motorized watercraft. Inter-canyon threshold segments of the river corridor will be open to watercraft using up to 60 horsepower motors year-round.

Primitive and wild segments of the river corridor, including Mariscal and Boquillas canyons, will be closed to all motorized watercraft throughout the entire year.

The park may impose future closures of certain river segments to motorized watercraft in order to protect endangered or sensitive species, as appropriate. Motorized watercraft use will be limited to conventional boats with inboard or outboard motors. Jet skis and other motorized watercraft that are used primarily for recreational purposes rather than providing access to the Park's resource will not be allowed.

3. Fishing - Fishing and seining for bait minnows will be allowed on all portions of the Rio Grande within the Park. Taking fish from or releasing fish into any tributary stream of the Rio Grande or other stream, spring, or pond in the Park, however, will not be allowed.

Unless otherwise stated in the Code of Federal Regulations (Title 36), State fishing regulations apply in the Park, but a State fishing license is not required. A free Service fishing permit, issued at visitor contact stations, will be required, one permit per party per trip.

Twenty-five fish, per person per day or in possession, will remain as the catch limit. The catch limit will not apply to minnows possessed for bait. Fish caught in the Park may be used for personal consumption only; they cannot be sold.

Fish parts remaining after cleaning will be removed as trash or deposited in the main river current.

As with other wildlife species, terrestrial and aquatic invertebrates are protected in the Park. The Service will allow no collecting of worms, larval insects, or other non-fish life forms. No live bait will be used,

except minnows obtained from the Rio Grande within the Park.

The use of pole and line, rod and reel, hand line, and throw line will be allowed, but jug fishing and trot lines will not be allowed. Jug fishing is defined as using a free floating object with a hook attached.

Unattended throw lines must have an identification tag attached between the tie point and first hook and must be removed by the owner. The tag must include name and address of the person using the line and the date the line is set out. Fishing lines may not be left unattended for more than 24 hours.

4. Access - The Service will provide for access above and below the three major canyons. Access to the river above Santa Elena and below Boquillas Canyons is currently provided outside the Park at Lajitas and at Heath Canyon, both of which are private property. National Parks and Conservation Association (NPCA) is negotiating a land exchange at Heath Canyon and, if successful, will provide for public access.

The Park will provide access to the river corridor at developed access points for recreational users of most ages, abilities, and physical limitations contingent upon the river's dynamics. Vehicles will be able to drive to the river's edge. Access at primitive access points will be available by vehicle to the river bank, although not to the river's edge.

The Service will provide ramps to the river for access at Santa Elena Take-out and Rio Grande Village, and may provide a primitive developed access site near Reed Camp should the need develop. Primitive access (road to river bank) will be provided at Talley, Solis, and Cottonwood Campground. All other areas where the river is accessible to carry-in boating will be considered designated but undeveloped launch points except perhaps during periods of high use.

Toilets and trash receptacles will be provided at developed access points within the Park reached by paved roads. The Service will consider ways of providing them at Lajitas and Heath Canyon. No facilities will be provided at other access points.

5. Human Waste - All solid human waste will be carried out with the following exceptions:

a. Carry out will be encouraged for private use on the river between the Santa Elena Take-out and Talley, and between Solis and the entrance to Boquillas Canyon. Human waste impacts will be monitored in these areas, however, and further actions taken if required.

b. Carry out will not be required for kayak-only or single canoe trips.

The Service will require systems compatible with septic tank system disposal, except for users of the Santa Elena dump station. Those users can continue to use paper bags until the present dump station is replaced with one which can handle waste from bagless systems.

Pending available funding, a new disposal site, meeting the EPA's human waste disposal requirements, will be developed to serve west-bound users at the Santa Elena takeout, Castolon, or the north end of Old Maverick Road. The system accepting paper bags will remain functional until that time. A second disposal site for north-bound users will be developed at Panther Junction or Persimmon Gap.

The carry-out requirements will go into effect as identified in the implementation section of this Plan regardless of the status of disposal facilities provided in the Park.

The Service will seek retailers in the area to sell or rent human waste carry-out systems. The Service will educate the public on the need for and the methods of human waste carry-out systems.

6. Recreational Use Limits - Use Limits for the various zones will preserve the recreational experience of the diverse types of river users from social and environmental standpoints. The limits will also protect the cultural and natural resources upon which all such experiences depend. Use limits will be based upon the Texas A&M Study (Stewart, 1993), an examination of permits issued in 1990, 1991, and 1992 (Appendix 6), and physical attributes of the river segments. The Park reserves the right to adjust use limits dependent upon additional data.

DEFINITIONS -

- A group is defined as a party of people who will stay together during their trip, including meals and camping. Each group needs a permit.

- Commercial trips offer services and activities to the public which result in compensation. Refer to section IX.F.7. for additional information.

- Special groups consists of educational, research, governmental organizations, etc., that fall outside the definition of commercial. Refer to section IX.F.3. for additional information.

- A launch is defined as a start or an entry from another river segment. Trips proceeding from one river segment into another will be considered a new launch in the second river segment.

THRESHOLD SEGMENTS:

Group Size Limits - Each commercial company or special use group may launch no more than 30 people, excluding commercial guides, on any threshold river segment each day. Each private group may not exceed 30 persons per day.

Launch Limits - For the western Park Boundary to the Santa Elena Canyon Take-out segment:
- six commercial companies may launch any combination of day, overnight, and multi-day trips per day;
- five private trips may launch per day; and
- one special use trip may launch per day.

For the Santa Elena Take-out to Cottonwood Campground and from the La Clocha to Boquillas Canyon Entrance segments:
- four commercial companies may launch per day;
- twelve private trips may launch per day, and
- one special use group may launch per day.

Only day use will be allowed on these river segments.

For the Cottonwood Campground to Reed Camp and the Solis to La Clocha segments:
- three commercial companies may launch per day;
- eight private trips may launch per day; and
- one special use group may launch per day.

PRIMITIVE SEGMENTS:

Group Size Limits - No group or trip may exceed 20 people, excluding commercial guides, in any primitive river segment each day.

Launch Limits - For the Talley to Solis segment:

- one commercial company may launch in any combination of day, overnight, and multi-day trips per day;
- one commercial company may launch one day trip per day;
- three private trips, day or overnight, may launch per day; and
- three special use group may launch per week (Sunday through Saturday).

For the Reed Camp to Talley segment:

- one commercial company may launch in any combination of day, overnight, and multi-day trips per day;
- one commercial company may launch a day trip per day;
- three private trips may launch per day; and
- three special use group may launch per week (Sunday through Saturday).

WILD SEGMENT:

Group Size Limits - No groups may exceed 20 persons, excluding commercial guides.

Launch Limits - Boquillas Canyon entrance to the eastern Park boundary.

- One commercial company may launch in any combination of day, overnight, and multi-day trips per day;
- three private trips, day or overnight, may launch per day; and
- three special use trip may launch per week (Sunday through Saturday).

Launches for Boquillas Canyon will not be counted against the limits for the La Clocha to Boquillas Canyon entrance segment.

River Segment	Zone	Commer Launch	Priv. Launch	SUP Launch	#'s*	Motor
West Boundary - SEC Take-out	T	6	5	1	30	ele. only
SEC Take-out - Cottonwood Camp (day use only)	T	4	12	1	30	Y
Cottonwood Camp - Reed Camp	T	3	8	1	30	Y
Reed Camp - Talley	P	1 1 day	8	3/wk	20	N
Talley - Solis	P	1 1 day	8	3/wk	20	N
Solis - La Clocha	T	3	8	1	30	Y
La Clocha - Boquillas Can. (day use only)	T	4	12	1	30	Y
Boquillas Can. - east boundary	W	1	3	3/wk	20	N

*excluding commercial guides

Figure 5: Characteristics of the Proposed Action

B. Natural Resources - The following resource regulations state general provisions guiding resource protection and are excerpted from Title 36, Code of Federal Regulations and the Park's Compendium, which should be referred to for a complete listing of resource protection regulations.

Possessing, destroying, injuring, defacing, removing, digging, or disturbing plants, animals, fossils, minerals, or other natural features is prohibited.

No fruits, nuts, berries, edible plants, or edible plant parts may be collected, even for personal consumption.

Between February 1 and July 15 of each year, the following areas may be closed to public access to minimize disturbance to nesting Peregrine falcons: the

Mariscal Canyon Rim west of Cross Canyon; within one-quarter mile of the Santa Elena Canyon Rim; and the Santa Elena Canyon Rim's extension to Bruja Canyon. The Santa Elena Canyon entrance to the mouth of Alamo Creek, Talley to Solis, and between the entrance and exit of Boquillas Canyon are closed to motor use. As the birds expand their range and develop new territories, additional closures may occur. Closures are implemented only if birds are nesting; specific closures will not be implemented if the birds abandon a site.

1. Resource Protection -

   a. Endangered and Threatened Species - Action plans for monitoring and protecting endangered species populations occurring within the Park will be developed. A compilation of Federally-listed Endangered, Threatened, Category I and Category II species is contained in Appendix 7.

   Human use of certain areas or habitats may be restricted for the protection of endangered species. Notice of such restrictions will be made in advance when possible, as part of an approved action plan.

2. Wildlife - The Service will seek to improve wildlife habitat in the riparian corridor.

Educational outreach activities in neighboring American and Mexican communities will continue to include messages which encourage appreciation of and support for park wildlife.

3. Aquatic Habitats (including fisheries) - The Park will seek to implement monitoring of aquatic organisms on a continuous, long-term basis. When correlated to influences such as pollution, these data will show changes which may be interpretable as to cause-and-effect relationships. These results will support efforts to protect the river environment.

4. Riparian Habitats

   a. Sensitive Plant Species - The Park will monitor sensitive plant populations occurring in the river corridor to detect changes, which indicate the need for increased protection. This will be completed on an annual basis, if possible.

b. Exotic Plant Species - Existing Service budgets do not allow for effective control of riverside exotic species, primarily grasses and tamarisk. These species continue to usurp and displace native species. Even if control methods were affordable, flood events would cause rapid and widespread reestablishment of exotic species.

The Service will attempt to control introduced species in sensitive locations, such as spring environments and sites where rare, threatened, or endangered species could be adversely affected by non-native competitors.

C. Cultural Resources - Park management will continue to pursue the means to survey and document unrecorded archeological and historic sites. The Service will seek to develop programs to monitor human impacts upon such sites.

1. Regulations - The following resource regulations state general provisions guiding resource protection and are excerpted from Title 36, Code of Federal Regulations and the Park's Compendium, which should be referred to for a complete listing of resource protection regulations.

a. Possessing, destroying, injuring, defacing, removing, digging, or disturbing a structure or its furnishings of fixtures, or other cultural or archeological resources is prohibited.

D. Recreational Resources

1. Regulations - The following recreational regulations state general provisions guiding resource protection and are excerpted from Title 36, Code of Federal Regulations and the Park's Compendium, which should be referred to for a complete listing of regulations.

a. Within the boundaries of the Park, the Rio Grande is closed to motor vehicle traffic, whether self-powered or under tow.

b. Camping is not allowed within one-half mile of any developed area or road, except in developed campgrounds or at designated backcountry road campsites.

The area between the upriver end of the Santa Elena Canyon Nature Trail and Castolon, bounded by

the Rio Grande and Park Route 16; the river floodplain from one-half mile upstream from the mouth of Tornillo Creek to the Boquillas Canyon trail terminus; and within one-half mile of San Vicente Crossing are closed to camping.

c. Wood fires contained in firepans located within the floodplain of the river in areas that are open to camping are allowed. Only dead and down wood from the floodplain may be used. Charcoal fires contained in fire pans may be used in any area of the river floodplain. Fire remains must be cold and out, and deposited in trash receptacles or carried out of the Park, except for non-floatable debris that may be placed in the main current of the river.

d. On the river, liquids must be strained (including dishwater) and deposited in the river. Strained materials must be carried out and deposited in a trash container.

e. Dogs (except guide, search, and hearing ear dogs), cats, and other pets are prohibited on the river.

f. Alcoholic beverages are prohibited in the Langford Hot Springs area, including the parking area, the loop trail, and the area from the mouth of Tornillo Creek to one-half mile downstream from the springs along the Rio Grande. Nude bathing is also prohibited at Langford Hot Springs.

E. Resource and Use Impact Monitoring - Little impact monitoring has been conducted in the Park. Baseline documentation of backcountry campsite impacts, including specific campsites within the river corridor, has been made. Cyclic monitoring programs, which identify change in camping and livestock impacts over time, however, are not in place.

Park Management will coordinate efforts to devise monitoring programs for human use and livestock impacts. Park Management will strive to implement a program which establishes acceptable impact limits, monitors change over time, and provides management level responses to maintain impacts below established limits.

F. Administration

1. Considerations in Managing Boating Use - Factors, which because of law, regulation, or circumstances,

influence the development of the River Use Management Plan include:

- the international boundary with Mexico;
- Mariscal Canyon through Boquillas Canyon is included in the National Wild and Scenic Rivers System;
- threatened and endangered species located within the river corridor, including the cactus, Coryphantha ramillosa; the Peregrine falcon, Falco peregrinus; and Big Bend gambusia, Gambusia gaigei;
- historic and prehistoric sites;
- limited vehicle access to much of the river corridor;
- the limited number of large campsites in Santa Elena and Mariscal Canyons;
- Executive Orders 11990 and 11988, which prohibit placing structures in the floodplain;
- water quality and volume as affected by upstream use by the states of Colorado, New Mexico, and Texas under the direction of the Rio Grande Compact Commission and the IBWC and Mexico; and
- natural river dynamics such as erosion and course changes.

2. Administrative Constraints and Responsibilities - The Service will provide access to the river, make park rules and regulations available to the public, enforce the rules and regulations, respond to emergencies in the river corridor, monitor park resources and user impact upon those resources, and manage commercial and private use of the river. The degree to which this is carried out will be dependent upon the park budget.

The Park has one Concessions Management Specialist who oversees all commercial activity in the park, including commercial use of the river. The River Rangers work with the Concessions Management Specialist to monitor commercial use of the river and enforce authorization stipulations. Two River Rangers patrol, enforce regulations, provide emergency services, and monitor resources along the river corridor.

River information is available to the public by phone or mail. Park visitor centers provide publications and an opportunity to speak with a park employee. Funding levels presently require the closure of some visitor centers during the low visitor use months.

The Park presently cannot assume the workload a reservation system would create.

3. Permit System Management - The Service requires a permit for the use of any watercraft (except day use inner tubes) within Park boundaries. Permit numbers will be unrestricted until use limits are met or exceeded. Then permit numbers will be restricted, starting the following year, but only for the specified period and location for which use limits were met or exceeded.

Example: No use limits are met or exceeded until Thanksgiving weekend, 1998, when private use in Boquillas Canyon exceeds the established limit. Permits would still be issued in unrestricted numbers the following year (1999) except for Thanksgiving weekend in Boquillas, when private permits would be limited. Continuing with the example, during the second week of March, in 1999, commercial use in Santa Elena Canyon (to that point unrestricted) exceeds the established limits. The following year (2000), there would be two periods for which the number of permits issued would be limited: the second week of March for commercial use in Santa Elena Canyon and Thanksgiving weekend for private use in Boquillas.

If use of an area drops below the established use limits for three consecutive years, permits will once again be issued in unrestricted numbers.

a. Unrestricted use - Until use limits are exceeded and limitations implemented, permits will continue to be issued as currently done. Private groups can obtain a permit up to 24 hours prior to their launch in the park, or for Santa Elena trips, at the Barton Warnock Environmental Center self-permit station. Commercial outfitters will continue to issue permits to themselves.

b. Restricted use, private - Once permit numbers for a location during a specific period are restricted for private use, permits issuance will be controlled. Private permits will be issued on a first-come basis, up to 24 hours prior to the launch date. Park staff will maintain a control chart, and once use levels have been reached, permits will no longer be issued for that location for that day. Private users will be able to obtain a permit from the staff at the Barton Warnock Environmental Center for the restricted

period (if the use limit has not been reached) but will not be able to self permit.

Should the Service incur significant expenses to administer private permits or a permit reservation system, special use permits may be issued to users at a cost intended to recoup expenses.

c. Restricted use, commercial - Once permit numbers for a location during a specific period are restricted for commercial users, commercial users will be required to apply for that period's launch dates. They will continue to issue permits to themselves for all unrestricted locations and dates.

The Service will notify commercial outfitters by August 1 of the specific locations and dates of controlled launches for the following year. Commercial outfitters will submit requests to launch trips on certain dates by September 1. The Service will grant launch dates by October 1. Scheduling conflicts (dates for which launch demands exceed availability) will be resolved by the commercial outfitters or a random computer lottery. A fee for each launch request may be charged to cover the cost of administering the permit program.

d. Special Group Parties - Permits will be issued to special groups on a first-come basis, up to six months in advance of the launch date. Since special use permits are fewer and more controllable, use will never be allowed to exceed the established use limits.

In some cases, the Service will issue a one-time Special Use Permit (SUP) to public institutions and governmental or quasi-governmental organizations. Examples of institutions that may receive consideration for a SUP include university recreational organizations, military installation recreational groups, museum-sponsored tours, etc.

An organization must apply for a separate SUP prior to each trip, pay the SUP fee, and meet all the special conditions. A SUP does not limit the obligation of the Superintendent to issue similar permits at the request of other persons seeking to conduct the same or similar activities in the area. Neither does it constitute a concession

contract or permit within the meaning of 16 U.S.C. 20 et seq. No preferential right of renewal attaches to the permit.

4. Boat Permits - The following are special conditions of all river use permits:

a. Each person shall have a U.S. Coast Guard approved personal flotation device (PFD) which is properly fitted, in serviceable condition, and immediately accessible while on the river. Type I, III, or V PFD's are required for Santa Elena and Mariscal canyons. PFD's must be worn in Class II or greater difficulty whitewater. An extra PFD will be carried on each trip.

b. Each vessel shall carry an extra paddle or oar; kayaks shall have an extra paddle per party.

c. Each group using inflatable vessels, except air mattresses or inner tubes, will carry an operable pump and a patch kit capable of making major repairs.

d. No vessel shall carry more than a safe load (in persons or total weight) considering the type of craft, intended use area, and water and weather conditions.

e. Inner tubes are not allowed in Santa Elena or Mariscal canyons.

5. Interpretation and Visitor Information - The Service has identified three target groups with specific information needs:

- Service personnel directly or indirectly involved in implementing the river use management program.
- Related agencies and park neighbors, including those adjacent to river boundaries and those receiving economic benefits from river use.
- Visitors and the general public, including park users and permittees, special interest groups, Park and local community residents, Park concessions employees, and the media.

Service personnel must be aware of river use management activities to ensure the effective dissemination of information to the general public. The entire park

staff should be familiar with the River Use Management Plan and policy formulation, resource protection, recreational use, and visitor safety. The Service will accomplish this on-going education program through training, general employee meetings, and active participation by park staff in the Park's river management program.

Park Management will assure an open line of communication with all affected groups, such as neighbors and Federal, State, and local agencies with a vested interest in the Park's river use management activities.

The Park's Public Information Officer (PIO) will serve as the key person to disseminate general information and generate press and public information releases. The Concessions Management Specialist will distribute pertinent management information to commercial operations.

The general staff, with Interpretation and Visitor Services taking the lead, will disseminate accurate river use information to the visiting public. This includes interpretation of the river ecosystem, river use regulations, safety information, and recreational skills. In conjunction with other park divisions, the Division of Interpretation and Visitor Services will develop techniques, such as bulletin boards at access points, to explain river use management policies to the public.

6. Safety, Search, and Rescue - Hand moving of driftwood that blocks the channel and creates a potential safety hazard will be allowed. Moving any geologic feature, such as boulders or gravel, is prohibited.

Service regulations require that all incidents, which involve a personal injury requiring more than first aid, property damage more than $100, evacuations, etc., must be reported to the Park. The Park directs patient treatment and decides upon further evacuation or rescue procedures should an incident require resources beyond those immediately available to the involved party.

7. Commercial Use - The Code of Federal Regulations (36 CFR 5.3) requires that any business or commercial activity receive written authorization. Commercial operators must comply with detailed operating

conditions as defined in an attachment to their authorization.

The Service has defined commercial as

> "All services and activities offered to park visitors and/or the general public, which use park resources, and are undertaken for or result in compensation, monetary gain, benefits, or profit to an individual, organization, or corporation."

Commercial status is not determined based upon whether or not such entity is organized for purposes recognized as non-profit under local, State, or Federal law.

To be considered noncommercial, all members of the group must share in the preparation of the trip (logistics, food purchase, equipment assembly, transportation, and vehicle shuttle) and conduct of the trip (including food preparation and sanitation). Collecting a set fee (monetary compensation), payable to an individual, group, or organization for conducting, leading, or guiding a noncommercial river trip is not allowed. The trip permittee should delegate responsibility (financial and otherwise) to other trip members for various aspects of trip preparation and conduct.

Trips may be considered noncommercial even though a member of the trip, within his or her normal scope of employment, receives a salary from an educational institution or non-profit organization to participate in the trip. This salary may not come directly through fees contributed by members of the party. No person may be hired or paid to participate in a trip operating under the noncommercial permit system.

Local commercial companies also have authorization to conduct salvage operations on the river. Private boaters may contract with the authorized companies to retrieve any equipment they may have been forced to abandon. Commercial companies will notify the Service of any salvage operations that they conduct.

XI. Implementation Schedule

The Service recognizes that many aspects of the Plan will require a period of public education before strict implementation can occur. The Plan will be implemented on October 1 of the year following its approval. This will allow commercial companies to honor reservations they may have already made before converting to new limits and practices. It will also provide the Service with the time needed to develop new interpretive literature and public announcements to inform river users of new regulations and requirements.

XII. Environmental Assessment (EA)

A. Purpose and Need

The Service is legally mandated to protect the natural and cultural resources of the Park for the benefit of future generations. The Service must also provide visitors the opportunity to enjoy appropriate activities. The River Use Management Plan serves as an administrative guide for the management of river use. It includes strategies for protecting park resources and values and provides for appropriate uses.

The actions proposed in the River Use Management Plan address changing demands and expectations and ensure the protection of park resources into the future.

Under the National Environmental Policy Act, management actions must be considered regarding their benefits, their costs, and their impacts upon different resources and values. Reasonable alternatives to the actions must also be considered, including a No-Action alternative. The No-Action alternative is defined as leaving existing conditions, policies, or actions in place.

This EA gives readers an understanding of actions being proposed, provides a review of possible alternative actions, and discusses consequences of each. The critical resources and issues, which are considered for each alternative, include recreational values, wildlife and fish, threatened and endangered species, cultural resources, Wild and Scenic River values, aesthetic values, social and economic values, water quality, and air quality.

The EA also serves as a forum through which interested parties may comment upon the proposed actions and alternatives. Managers consider those comments when making final river use management policies.

After receiving and considering comments upon the plan and its EA, the final River Use Management Plan will be developed. The final plan will provide management direction for five years.

B. Zoning

1. Proposed Action - The Service will manage the various river segments to perpetuate a variety of experiences. Three management zones include threshold, primitive, and wild. Visitors in the threshold zones can expect frequent encounters with other parties, except possibly during the off-season. Developed areas may also occur within the river corridor designated as threshold. The threshold river segments will include the western park boundary to Santa Elena Canyon take-out, Santa Elena Canyon take-out to Cottonwood, Cottonwood to Reed Camp, Solis to La Clocha, and La Clocha to Boquillas Canyon Entrance. These segments total 69 miles or 58.7 percent of the 118-mile river corridor.

The primitive zone will provide opportunities for less frequent encounters with other parties than in the threshold zone but more than in the wild zone. Evidence of human activities will be minimal although noticeable. These conditions will allow primitive zone users to experience more solitude than users of the threshold zone. The primitive segments will include Reed Camp to Talley and Talley to Solis. These segments comprise 28 miles or 23.8 percent of the river.

Of the three management zones, users of the wild river zone will experience the fewest human influences and will encounter the greatest opportunity for solitude. Because of the length of Boquillas Canyon and the absence of roads and other human development, Boquillas Canyon has been designated as the wild zone. The wild zone will extend from the Boquillas Canyon Entrance to the eastern park boundary. The wild river segment comprises the smallest management unit of 17.5 percent or 20.5 miles.

Consequences

a. Recreational Values - The proposed action formalizes and preserves current recreational use patterns. Because users will encounter the conditions they anticipate, zone management will enhance their experiences. People seeking a certain experience can plan their trip around the definitions of threshold, primitive, and wild. Managing river zones will ensure that a diversity

of experiences will be available in the future by preventing unrestricted use.

b. Wildlife and Fish - Because zones will prevent unrestricted increases in use, current conditions for wildlife and fish will be preserved throughout the majority of the year and improved during high use periods.

c. Threatened and Endangered Species - Zoning will preserve current conditions for peregrine falcons, Big Bend gambusia, bunched cory cactus, and Chisos Mountains hedgehog cactus by preventing unrestricted increases in use, especially during peak seasons. Peak use of the river occurs during the peregrine nesting season. Managing the primitive and wild zone to provide for more a wilderness experiences will result in lower numbers of launches and people than is currently the trend during this critical period.

d. Cultural Resources - In all areas, disturbances to cultural features will remain illegal. Preventing unrestricted increased use will result in greater protection of these resources in the future.

e. Floodplain (Riparian) Resources - Lunch sites, paths to and from points of interest, and campsites will continue to be used, but future increases will be restricted. In the zones managed to provide for wilderness experiences, lower than current use will occur during peak seasons.

f. Wild and Scenic River Values - The Wild and Scenic Rivers Act identifies the preservation of a primitive experience in its definition of wild and scenic river segments. By managing the river to ensure a diversity of experiences, including wilderness and solitude, zones would enhance wild and scenic river values in the wild and primitive zones, especially during peak seasons.

Because the river from the western park boundary, including Santa Elena Canyon, lies beyond the wild and scenic designation, no conflict with wild and scenic values exists. Other threshold segments lie within the scenic designation, which states that "...shorelines or watershed still largely

primitive and shorelines largely undeveloped, but accessible in places by roads." The primitive and wild zones meet the criteria of "wild" as defined by the Wild and Scenic Rivers language. These areas are "...generally inaccessible except by trail, with watersheds or shorelines essentially primitive...," except at access points.

g. Aesthetic Values - By restricting unlimited growth, the threshold zone would not change from present; visitors could expect other people, more impacted campsites, and social trails in the river corridor. Aesthetic values for those seeking solitude should be enhanced in the primitive and wild zones, especially during peak seasons.

h. Social and Economic Values - A wider variety of experiences will be guaranteed by zone management. Current social values in the threshold zone would remain because future growth would be limited. Threshold users would expect to encounter other groups and evidence of human development. Social values would be enhanced, especially during peak seasons, in the primitive and wild zones for those users seeking wilderness experiences and solitude.

Commercial outfitters will not be able to plan for unrestricted growth in the future, especially during peak seasons. This may result in increased marketing and use of the off-season.

i. Water Quality - No solid documentation exists about recreational river users' effects upon the water quality. The proposed alternative would not substantially alter the river quality.

j. Air Quality - No documentation exists about recreational river users' effects upon the overall air quality. Some very localized improvement may result in wild and primitive zones because of reduced numbers of campfires resulting from lower use levels. The overall impact, however, would be negligible.

2. Alternative 2: No Action - Current policies and trends would continue. Future growth would not be restricted. Although river users may plan their trips for anticipated river experiences in specific river

segments, no management zones will exist. Users' expectations may not be realized.

Consequences

a. Recreational Values - Under the no action option, current use trends would continue; use would be unrestricted. Visitors would develop plans based upon their expectations. Because the river would not be managed to ensure specific experiences, however, all areas would be similar and visitors' expectations may not be met. Wilderness and solitude would be more difficult to find, especially during peak seasons.

b. Wildlife and Fish - Wildlife and fish would continue to be affected by current trends and unrestricted use.

c. Threatened and Endangered Species - Peregrine falcons in Santa Elena, Mariscal, and Boquillas canyons and threatened plant resources would continue to be exposed to current trends and unrestricted use. Increased use would probably occur in all canyons, especially during the critical nesting season.

d. Cultural Resources - In all areas, disturbance to cultural features would remain illegal. Impacts upon cultural resources would continue according to current trends and unrestricted use.

e. Floodplain (Riparian) Resources - Lunch sites, trails to and from points of interest, and campsites would continue to be affected by current trends and unrestricted use. There would be no improvement along the river corridor.

f. Wild and Scenic River Values - Current unrestricted trends of growth would probably continue. Visitors seeking a primitive experience that the Wild and Scenic Rivers Act strives to ensure would probably not be able to encounter solitude, especially during peak seasons.

g. Aesthetic Values - Current trends would continue and growth would remain unrestricted. Visitors would continue to encounter other parties along all river segments. Social trails and lunch

and camp sites would continue to be impacted with no improvement.

h. Social and Economic Values - Current trends would continue and unrestricted increases would occur. A diversity of experiences would not be provided to river users. Those seeking solitude and wilderness experiences would not be ensured realizing their expectations, especially during the peak seasons. Commercial outfitters could continue to plan for unrestricted growth.

i. Water Quality - No solid documentation exists about recreational river users' effects upon the water quality. Small amounts of degradation may occur to the water quality as current use trends continue unrestricted.

j. Air Quality - No documentation exists about recreational river users' effects upon the overall air quality. It is probably negligible, except for short periods at certain campsites. Current use trends would continue unrestricted.

3. Alternative 3: Designate Reed Camp to Talley and Boquillas Canyon as Primitive and Talley to Casa de Piedre as Wild - The Service will manage river segments to perpetuate a variety of river experiences as described in the proposed alternative. This alternative designates the Reed Camp to Talley and the Boquillas Canyon entrance to the eastern park boundary river segments as primitive. The Talley to Solis and Solis to Casa de Piedra river segments, which include Mariscal and San Vicente canyons, would be designated as wild.

This alternative decreases the threshold segments from 69 miles to 61 miles or from 58.6 percent of the river corridor to 52.1 percent. It increases the primitive segments of the river corridor from 28 miles to 38.6 miles or 23.8 percent to 32.8 percent. This alternative also decreases the wild segments from 20.6 miles to 17.7 miles or 20.6 percent to 15.1 percent.

The designation of Mariscal and San Vicente canyons as the wild zone can also provide a wilderness experience. Because of the canyons' remoteness and inaccessibility, little evidence of human effects is apparent. Trespass livestock have not degraded campsites or impacted the vegetation as they have in other areas. An access road

to Solis occurs in approximately the middle of the wild zone between the river segments; at certain locations the River Road lies within a quarter mile of the river. Use trend data 1983 through 1992 indicate that this portion of river receives the least number of visitors.

Consequences - For the following 10 values, this alternative slightly decreases the length of the river managed as threshold zone by 8 miles and wild zone by almost 3 miles, but increases the length of the primitive zone 10.6 miles from the proposed alternative.

a. Recreational Values - Alternative 3 formalizes and preserves current recreational use patterns as Mariscal and San Vicente canyons currently receive the least amount of use. Because users' trips will encounter the conditions they anticipate, zone management will enhance their experiences. People seeking a certain experience can plan their trip around the definitions of threshold, primitive, and wild. The remoteness of the area enhances the wilderness experience.

b. Wildlife and Fish - Because zones will prevent unrestricted increases in use, current conditions for wildlife and fish will be preserved throughout the majority of the year and improved during periods of historical high use.

c. Threatened and Endangered Species - Zoning will preserve current conditions for peregrine falcons, Big Bend gambusia, and threatened plant resources by preventing unrestricted increases in use, especially during peak seasons. Peak use of the river occurs during the peregrine falcon nesting season. Managing the primitive and wild zones to provide for more wilderness experiences will result in restricted numbers of launches during this critical period and should provide additional protection for the peregrine.

d. Cultural Resources - In all areas, disturbances to cultural resources will remain illegal. Preventing unrestricted increased use will result in greater protection of these resources in the future.

e. Floodplain (Riparian) Resources - Lunch sites, paths to and from points of interest, and

campsites will continue to be used, but future increases will be restricted. In zones managed to provide for wilderness experiences, lower than current use will occur during peak seasons.

f. Wild and Scenic River Values - The Wild and Scenic Rivers Act identifies the preservation of a primitive experience in its definition of wild and scenic river segments. By managing the river to ensure a diversity of experiences, including wilderness and solitude, zones would enhance wild and scenic river values in the wild and primitive zones, especially during peak seasons.

g. Aesthetic Values - By restricting unlimited growth, the threshold zone would not change from present; visitors could expect encounters with other people, more impacted campsites, and social trails in the river corridor. Aesthetic values for those seeking solitude should be enhanced in the primitive and wild zones, especially during peak seasons.

h. Social and Economic Values - A wider variety of experiences will be guaranteed by zone management. Current social values in the threshold zone would remain because future growth would be limited. Threshold users would expect to encounter other groups and evidence of human development. Social values would be enhanced, especially during peak seasons, in the primitive and wild zones for those users seeking wilderness experiences and solitude.

Commercial outfitters will not be able to plan for unrestricted growth in the future, especially during peak seasons. This may result in increased marketing and use of the off-seasons.

i. Water Quality - No solid documentation exists about recreational river users' effects upon the water quality. The proposed alternative would not substantially alter the river quality.

j. Air Quality - No documentation exists about recreational river users' effects upon the overall air quality. Some very localized improvement may result in wild and primitive zones because of restricted numbers. The overall impact, however, would be negligible.

4. Alternative 4: Increase Threshold Zone - Considered but Rejected. The Service will manage river segments to perpetuate a variety of experiences as described in the proposed alternative. This alternative increases the portion of the river considered to be the threshold zone. The entire stretch of the river between west park boundary and Talley would be designated threshold instead of a portion of it being primitive. The threshold zone would be increased to 87 miles or 74 percent of the river as compared to 58.6 percent as described in alternative 1. The primitive zone would be decreased by 18 miles from 23.8 percent in the proposed action to 8.5 percent in this alternative. The wild designation would remain the same.

C. Motor Use

1. Proposed Action - Electric motors may be used in the threshold river segments, including Santa Elena Canyon, throughout the entire year. Santa Elena Canyon will be closed to all other motorized watercraft. Inter-canyon threshold river segments will be open to all types of conventional, gas-powered watercraft with motors up to 60 horsepower throughout the entire year. Primitive and wild zones of the river corridor, including Mariscal and Boquillas canyons, will be closed to all motorized watercraft throughout the entire year. Unless otherwise indicated, any reference to motors refers to gas-powered motors.

Consequences

a. Recreational Values - Motor use for recreational boating or fishing purposes within Santa Elena, Mariscal, and Boquillas canyons will be eliminated. Opportunities for the use of electric motors in the Santa Elena Canyon segment will be increased, however, from six months to the entire year. Motor users, especially fishermen displaced from the wild and primitive zones, may shift use to the inter-canyon threshold zone resulting in an overall increase of use for those river segments. Therefore, non-motorized users in the inter-canyon threshold zone should expect increased encounters with motorized watercraft. Encounters within Santa Elena Canyon will be limited to only low disturbance, electric motors.

b. Wildlife and Fish - Any disturbance to wildlife populations from noise, wake action, or fuel leaks generated by motorized watercraft would be eliminated in the wild and primitive zones and Santa Elena Canyon. Inter-canyon areas, however, will have the potential for greater wildlife disturbance because those river segments may receive increased use of all motor types. Reduced fishing because of motor restrictions in the canyons may benefit fish populations.

c. Threatened and Endangered Species - Peregrine falcons would be free of disturbance from noise-producing motors within Santa Elena, Mariscal, and Boquillas canyons. Sensitive species found in the inter-canyon threshold zone will continue to be

exposed to motor noise and associated impacts unless special closures were effected.

d. Cultural Resources - Elimination of motors in the primitive and wild zones would make access to cultural sites more difficult, which would provide less opportunity to harm cultural resources.

e. Floodplain (Riparian) Resources - Access to and from the river by motorized watercraft users will continue at specific put-ins and take-outs. Impact will continue to occur at these sites relative to use. Further studies will be needed to document any cumulative impact upon the riparian environment. Motorized restrictions within primitive and wild zones and Santa Elena Canyon would eliminate wave action erosion in those areas. Displaced motorized use and its possible increased use in the inter-canyon threshold zone may negligibly increase any impact of wave action upon the shore line.

f. Wild and Scenic River Values - The proposed action will limit historic, motorized use within the wild and primitive zones and Santa Elena Canyon. The use of motors produces negative effects with regard to wild and scenic river values by disturbing the ambience for visitors. Wild and scenic river values with regard to natural tranquility will be enhanced.

g. Aesthetic Values - Any noise, echoes, and vibrations associated with motorized use within the canyons will be eliminated, enhancing aesthetic values in those locations and protecting solitude and tranquility. Since most river use occurs in the canyons, this would potentially affect a large group of users.

h. Social and Economic Values - The proposed action is consistent with wild and primitive experiences and expectations of river users. Social values associated with motor use in the canyons would be eliminated, along with any economic value associated with fishing from motorized watercraft. Motor use groups (for fishing or other recreational use) would be displaced from Santa Elena, Mariscal, and Boquillas canyons. This displacement may cause increased encounters in the inter-canyon threshold

river segments between motorized and non-motorized river users. The proposed action will eliminate motorized use, which had been an historic use, within the wild and primitive zones and Santa Elena Canyon.

i. Water Quality - Limited knowledge exists about the effect of motor use upon water quality, especially with contemporary refinements and regulations upon small motors. If any such effects occur within the river corridor, they would be reduced. Water quality would be enhanced by eliminating contamination from gas and oil spillage and emissions in specified segments.

j. Air Quality - Although some current research has focussed upon small combustion motors and air pollution, limited knowledge is available, especially within constricted canyon environments. Nevertheless, this proposed action would eliminate any air quality degradation caused by motorized watercraft within the canyons.

2. Alternative 2: No Action - This proposal maintains conditions as they currently exist. Significant possibilities for future management include the prospect that the endangered peregrine falcon may become delisted, which would open the canyons to year-round motorized use. Steadily increasing conflicts between motorized and non-motorized users would probably occur simultaneously with overall increased use. Unless otherwise indicated, any reference to motors refers to gas-powered motors.

Consequences

a. Recreational Values - Current conditions for motorized recreational use would continue; the only limitation upon motor use would occur during the peregrine falcon nesting season. This alternative maintains recreational values for motorized users at current levels. If the endangered species becomes delisted, however, year-round motorized use within the canyons may become possible. This alternative enhances recreational opportunities for motorized boating. Non-motorized boaters may be less satisfied with their trips because of the intrusion of motorized boats and their noise.

b. Wildlife and Fish - Any disturbance to wildlife populations from motorized recreational use would continue. If trends show an increase in recreational use of the river corridor by motorized watercraft, then associated increases in disturbances should also be anticipated.

c. Threatened and Endangered Species - Closures for peregrine falcon nesting and breeding would remain in effect, even to electric-powered watercraft. If peregrines or other sensitive species are found to use portions of threshold river segments such as San Vicente Canyon, those segments could then be closed to all motorized watercraft during the appropriate season.

d. Cultural Resources - This alternative should produce little or no change on motorized watercrafts' effects upon the cultural resources.

e. Floodplain (Riparian) Resources - Access to and from the river by motorized watercraft users will continue to occur at specific put-in and take-out sites. Impacts will continue to occur at these sites relative to use.

f. Wild and Scenic River Values - The Wild and Scenic Rivers Act identifies the preservation of a primitive experience in its definition of wild and scenic river segments. Motors detract from a primitive experience. They do enhance some users' recreation, another value of wild and scenic rivers.

g. Aesthetic Values - Noise, echoes, and vibrations associated with motorized use will continue or increase, reducing aesthetic values.

h. Social and Economic Values - Social values associated with those individuals who participate in fishing within Mariscal and Boquillas Canyons and any economic value they derive from harvesting their personal catch would remain. Social values for those seeking solitude may be degraded by motor use.

i. Water Quality - Limited knowledge of the effect of motors upon the water quality currently exists. If there are adverse effects, however, these will continue.

j. Air Quality - Although some current research has focussed upon small combustion motors and air pollution, limited knowledge is available about motors' effect within constricted canyon environments. This alternative will permit trends to continue at their present rate, both in motor use and resulting air pollution. Future modifications in combustion engines may reduce possible pollution sources.

3. Alternative 3: Limit Motor Use during Peregrine Falcon Nesting Season - This proposal would maintain limitations on all motor use in Santa Elena, Mariscal, and Boquillas canyons during the peregrine falcon nesting season even if the bird is no longer classified as endangered. This proposal would close the wild zone (Boquillas Canyon under the proposed action) to motorized use for the remainder of the year. From August through January, electric motors would be allowed in primitive zone, including Mariscal Canyon. From August through January, all motors up to 60 horsepower would be allowed in threshold zone, including Santa Elena Canyon. Unless otherwise indicated, any reference to motors refers to gas-powered motors.

Consequences

a. Recreational Values - All motor use for recreational boating or fishing purposes would be eliminated within Boquillas Canyon year-round. Since varying degrees of motor use would be allowed in primitive and threshold zones, the level of such use in these river segments may rise due to displaced users from Boquillas Canyon from August through January. Therefore, non-motorized users in the primitive and threshold zones, including Santa Elena and Mariscal canyons, may find increased encounters with motorized watercraft. Recreational values for motorized users would be enhanced over the proposed alternative but reduced from the no action alternative.

b. Wildlife and Fish - Any disturbance to wildlife populations from noise, wakes, or other activity generated by motorized watercraft would be eliminated from the wild zone. Fishing from motorized watercraft would be eliminated, enhancing natural fish populations. All other

zones, however, will have the potential for greater wildlife disturbance since those segments of the river will probably see increased use of various motor types.

c. Threatened and Endangered Species - Peregrine falcons would be free of disturbance from noise-producing motors in Boquillas year-round and in Santa Elena and Mariscal canyons during the nesting season.

d. Cultural Resources - Limitations would prevent easy access to cultural sites in Boquillas Canyon year-round and from February through July in Santa Elena and Mariscal canyons, which would provide less opportunity to harm cultural resources.

e. Wild and Scenic River Values - This alternative allows varying degrees of use in portions of the river which fall under the designation of the Rio Grande Wild and Scenic River. Such allowances for historic use follows the spirit of the amendment to the Wild and Scenic Rivers Act that adds the lower Rio Grande to the system. By preserving a primitive experience, wild and scenic river values would be enhanced in Mariscal and Boquillas canyons year-round and enhanced in Santa Elena Canyon for half of the year by the elimination of motors.

f. Aesthetic Values - Any noise, echoes, and vibrations associated with motorized use within Boquillas Canyon will be eliminated. Since other river segments may see increased motorized use, noise-related disturbance may also increase.

g. Social and Economic Values - Social values associated with those individuals who participate in motorized use for fishing or recreational boating would decrease year-round in Boquillas Canyon and in Santa Elena and Mariscal canyons from February through July. Opportunities for such use would continue for all other river segments. Since motorized use in threshold zones may increase, those individuals seeking values associated with non-motorized watercraft may have a more difficult time fulfilling their expectations. Due to the varying degrees of motorized use, annual closures, and displaced use,

there may be an increase in administration of the program required of the Service.

h. Water Quality - Limited knowledge of motors' effects upon water quality, especially with contemporary refinements and regulations upon small motors, exists. Any water quality impact generated within Mariscal and Boquillas canyons by motorized use would be eliminated. The threshold zone, however, may experience impacts relative to any increase in motorized use.

i. Air Quality - This alternative would eliminate any air quality problems associated with motorized watercraft within Mariscal and Boquillas canyons, but might exacerbate such problems in Santa Elena canyon and the inter-canyon stretches.

4. Alternative 4: Eliminate Motor Use - This proposal would eliminate all motorized use from the Rio Grande through the Park. Unless otherwise indicated, any reference to motors refers to gas-powered motors.

Consequences

a. Recreational Values - Although use of motorized watercraft on the Rio Grande constitutes a small percentage of all recreational use, this alternative would eliminate motors entirely. Recreational values for motor users, 7 percent of the permits from 1990 through 1992, would be eliminated, but recreational values for those seeking quiet and a more primitive experience, 93 percent of users, would be enhanced.

b. Wildlife and Fish - Any disturbance to wildlife populations from noise, wake, or other motor-related sources would be eliminated on all river segments. Impacts to fish from fishing using motorized watercraft would be eliminated.

c. Threatened and Endangered Species - Peregrine falcons would be free of disturbance from noise-producing motors within all river segments throughout the year.

d. Cultural Resources - This alternative prevents a means of easy access to cultural sites in the river corridor, which provides less opportunity to harm cultural resources.

e. Floodplain (Riparian) Resources - Access disturbance along the floodplain, especially in areas associated with fishing camps such as Solis, would be reduced with the elimination of motorized use. The disturbance of river bottom sediments, especially in shallow water close to the shore, would also be eliminated.

f. Wild and Scenic River Values - The General Management Plan for the Rio Grande Wild and Scenic River states that the Service will "...recognize the need...to continue historic usage..." and "...permit historical uses." Because the use of motorized watercraft is an historic use of the Rio Grande, this alternative does not comply with the General Management Plan. But the elimination of motorized watercraft brings the river more in line with the wild and scenic definitions of offering primitive experiences.

g. Aesthetic Values - This alternative may improve the aesthetic resources for the majority of river users but would eliminate an historical use that a small minority consider aesthetically pleasing.

h. Social and Economic Values - Social values associated with those individuals who participate in fishing would be reduced. Other special populations, such as the mobility impaired, would loose their means to enjoy the river corridor on an individual basis.

Subsequent to the elimination of motorized watercraft within Big Bend National Park, motorized users may seek alternative ways to fulfill their recreational needs. This may result in an increased use of commercial operations to provide such alternatives. Any conflicts that arise between users of motorized and non-motorized watercraft will be eliminated. The administrative details of annual closures to motor use because of nesting peregrine falcons would be eliminated.

i. Water Quality - Although the Service has no documentation about the effect of motorized watercraft upon the water quality, elimination of motors would prevent contamination from gas and oil spillage and emissions.

j. Air Quality - Although the Service has no documentation about the effect of motorized watercraft upon the air quality, elimination of motors would remove whatever contaminating influences exist.

D. Fishing

1. Proposed Action - Implement Proposed Fishing Policies - Fishing and seining for bait minnows will be allowed on all portions of the Rio Grande, but taking fish from or releasing fish in any tributary stream or other stream, spring, or pond in the Park will not be allowed. State fishing regulations will apply in the Park. A State fishing license will not be required, but a free Park permit will be. Twenty-five fish, per person, per day or in possession, will remain the catch limit. Approved fishing methods include the use of pole and line, rod and reel, hand line, and throw line, but not trot lines or jug fishing. Unattended throw lines must have an identification tag attached between the tie point and first hook. The tag must include name and address of the person using the line and the date the line is set out. Fishing lines may not be left unattended for more than 24 hours.

Consequences

a. Recreational Values - Fishing as a recreational activity will be preserved. Some recreational freedom will be reduced due to the exclusion of trot lines and jug fishing as fishing methods. The requirements to obtain a group fishing permit and to place an identification tag on a throw line will be added burdens to those participating in recreational fishing. The permit burden will be minimized, however, by adding fishing to the existing single-party permit required for boating or camping.

b. Wildlife and Fish - Use of fish as the sole consumable wildlife resource would continue. Tributary streams and springs, which serve as habitat for rare and sensitive species, would be protected from fish catching or release effects. The identification tag requirement for throw lines would provide an incentive against the abandonment of lines, which occurs with fish sometimes attached. The permit requirement would allow the Service to begin gathering fishing distribution, density, and intensity data. Data derived from the permits, coupled with proposed aquatic systems monitoring, will provide for more informed decision making processes of fish management.

c. Threatened and Endangered Species - Restrictions against catching from or releasing into tributary streams and springs protects the endangered Big Bend gambusia and other rare species, which use or may use tributary streams.

d. Wild and Scenic River Values - Protection of fish and wildlife contribute to the primitive values defined by the Wild and Scenic Rivers Act. Short-term existence of native fish populations would probably not be threatened. Fishing use data, along with aquatic resource monitoring would assist in identifying fishing-related threats, should these data become available.

e. Aesthetic Values - The aesthetic values of fishing would be preserved. The restriction against jug fishing would minimize visual aesthetic degradation. The requirement for identification tags on throw lines would help prevent abandoned lines from being left in view for lengthy periods. The requirement to carry remnant fish parts out as trash or deposit them in the river current would reduce the aesthetic impacts of fish cleaning. Aesthetic values for non-fishing people may be reduced by throw lines in backcountry settings.

f. Social and Economic Values - The existing social values of fishing would be preserved. Economic values related to purchase and sale of fishing equipment would not significantly change. Compliance with bait, fishing method, and line tag regulations could add minor economic burdens to those choosing to fish in the park.

2. Alternative 2: No Action - Current fishing methods include the fishing pole and line, rod and reel, throw lines, and trot lines. Jug fishing is prohibited. Seining is allowed for capture of bait minnows only. The Service does not require a state or park permit for fishing. Users may fish at all times and places along the main river. The personal catch limit is 25 fish per day or in possession. The Service prohibits the use of live bait other than locally caught minnows.

Consequences

a. Recreational Values - Fishing as a recreational activity would be preserved. No additional administrative burdens would be placed upon those choosing to fish.

b. Wildlife and Fish - The existing lack of knowledge regarding fishing distribution, density, and intensity would continue. The long-term effects of fishing would not be monitored or understood. Tributary streams and springs could be affected in unpredictable ways by fishing or seining.

c. Threatened and Endangered Species - Regulations protect the endangered Big Bend gambusia by preventing taking fish from or releasing fish into their habitat.

d. Wild and Scenic River Values - Protection of fish and wildlife contribute to the primitive values defined by the Wild and Scenic Rivers Act. Short-term health of native fish populations probably would not be in jeopardy. However, long-term health of native fish populations would not be guaranteed due to a lack of fishing distribution, intensity, and density data and a lack of aquatic resources monitoring.

e. Social and Economic Values - Existing social values associated with fishing would continue. No change in economic values, primarily related to sale and purchase of fishing equipment, would occur.

3. Alternative 3: Allow No Fishing in the Wild Management Zone - This alternative would exclude fishing from the wild zone (Boquillas Canyon in the proposed action). All fishing regulations described under the proposed action would be included under this alternative. Service mandates for protection of native species would be fulfilled in the wild zone. Protection of fish would be equal to that afforded other wildlife species. Fishing regulations on the Mexico side of the Rio Grande would not be affected by this policy. The unfished river segment, constituting 20.6 miles or 17.5 percent of the river, would serve as a comparison area for studies designed to assess

fishing effects on other river segments. Fishing, an historic use, would be eliminated in the wild zone.

Consequences

a. Recreational Values - No change would occur to recreational fishing in the major portion of the Rio Grande associated with the Park. Recreation associated with fishing would be excluded from the wild zone.

b. Wildlife and Fish - Fish fauna would be protected from fishing impacts in the wild zone. The protected river segment would provide a comparison area for studies assessing fishing impacts. Studies assessing other influences, such as pollution, would be unaffected by variables introduced by United States fishing activity.

c. Threatened and Endangered Species - No Federally-listed threatened or endangered fish species are known to exist in the wild zone.

d. Wild and Scenic River Values - Protection of fish and wildlife contribute to the primitive values defined by the Wild and Scenic Rivers Act.

e. Aesthetic Values - Aesthetic values derived from fishing in the wild zone would not be available. Aesthetics related to an environment free from human influences would be enhanced in this river segment.

f. Social and Economic Values - Social values associated with fishing would remain available in all river segments except the wild zone. Social values not related to fishing would remain unaffected. Economic values related to fishing equipment sale and purchase would not be significantly changed. Downstream landowners who charge for river access could experience a moderate loss of business due to the reduction of fishing opportunity near their access points.

4. Alternative 4: Allow No Fishing in the Park - Throughout the park river corridor, the fish fauna would be afforded equal protection with that mandated for all other species. Aquatic environments would be free from the effects of fish removal or introduction. This alternative changes the historic use patterns.

Consequences

a. Recreational Values - Recreational fishing in the Park would become unavailable.

b. Wildlife and Fish - The influences of fishing would be reduced significantly in the Rio Grande. To a greater degree, fish population and species dynamics would be unaffected by human influence.

c. Threatened and Endangered Species - No Federally-listed threatened or endangered fish species are known to occur in the Rio Grande within the Park.

d. Wild and Scenic River Values - Protection of fish and wildlife would not conflict with and should enhance Wild and Scenic River values.

e. Aesthetic Values - Aesthetics associated with fishing would be reduced. Aesthetics associated with experiencing an environment with minimal influence of humans would increase.

f. Social and Economic Values - Social values associated with fishing would not be available in the Park. Economic values related to sale and purchase of supplies and equipment used by fishing parties would be reduced. Due to a variety of alternative fishing opportunities in the region, the regional fishing, boating, and camping supply companies would not experience a significant reduction in income.

E. Access

1. Proposed Action - The Service will ensure access above and below the three major canyons. The Service will strive to ensure access across private property at Lajitas and Heath Canyon. Developed access, consisting of dirt ramps to the water, will be provided at Santa Elena take-out and Rio Grande Village. Primitive access, defined as a dirt or paved road to the river's bank, will be provided at Talley, Solis, and Cottonwood Campground. Undeveloped access consists of a road to a point near the river and a route to the water for carry-in access. If needs arise, a developed access will be provided near Reed Camp and a primitive access will be provided near Casa de Piedra. Toilets and trash receptacles will be provided at developed access points within the Park serviced by paved roads. The Service will seek ways to provide them at Lajitas and Heath Canyon, but will provide no other facilities at other access points. All river access points will be designated as launch sites. Developed access points will be constructed and maintained to provide accessibility to mobility impaired users, as allowed by river dynamics.

Consequences

a. Recreational Values - Recreational opportunities would exist much as currently occur. Developed and primitive access to the river would be the same although access at two new sites, in the inter-canyons river segments, might be developed. This may result in more opportunities for water-based recreation. Identifying all access points designated as launches will legitimize the current activity of launching motorized watercraft from backcountry areas.

Providing for public access above Santa Elena Canyon and below Boquillas Canyon would ensure that the recreational opportunities in those canyons continue as planned. Efforts to seek ways to provide restrooms and trash facilities at these locations would result in a more pleasant recreational visit. Access for mobility impaired users at developed access points would be maintained.

b. Wildlife and Fish - New launch areas between the canyons may result in more fishing activity.

Increased recreational use due to additional launch points may have a negative effect on wildlife.

c. Floodplain (Riparian) Resources. The development of new launch sites would result in the destruction of riparian vegetation. Designating launch sites at all locations where the river is accessible to carry-in boating may result in additional damage to vegetation as informal access trails are used to launch boats. Riparian vegetation may be negatively impacted at locations above Santa Elena Canyon and below Boquillas with improvements or the relocation of access points and facilities to those locations.

d. Wild and Scenic River Values - Some degradation of scenic values and the primitive character of the river will occur should an access point near Casa de Piedra be developed, although the level of development would be consistent with the primitive character of the surroundings. Restroom and trash facilities below Boquillas Canyon will add to the existing development. Road access to Casa de Piedra would be consistent with scenic areas as defined by the Wild and Scenic Rivers Act. No river access is planned into the river segments designated as wild.

e. Aesthetic Values - The development of toilet and trash facilities above Santa Elena Canyon and below Boquillas Canyon would detract from the site aesthetics but would also improve aesthetics through the reduction of litter. The development of launch sites could detract from area aesthetics if not done in an environmentally sensitive and pleasing manner.

f. Social and Economic Values - Securing public access above Santa Elena and below Boquillas Canyons should have a positive economic impact on local communities. The development and maintenance of two additional launch sites would place an additional strain on the park's budget but might provide further opportunities for commercial river operators in the park.

2. Alternative 2: No Action - This alternative maintains conditions as currently exist. Access to the river is generally undeveloped. In two instances,

landowners outside park boundaries have granted permission for boater access across their property, but no formal agreement exists with either. Developed access points at Lajitas, Santa Elena take-out, Rio Grande Village, and Heath Canyon consist of dirt ramps to the water. Primitive access, defined as a dirt or paved road to the river's bank, exists at Talley, Solis, and Cottonwood Campground. Undeveloped access, consisting of a road to a point near the river and a route to the water for carry-in access, exists at Jewels Camp, Woodsons, Black Dike, Hot Springs, and La Clocha. A variety of roads serve the river access points, ranging from paved to backcountry roads for four-wheel drive, high clearance vehicles. Four-wheel drive may be required to access some put-in and take-out points during periods of wet weather. The Service provides restrooms and trash receptacles at or near the Santa Elena take-out and Rio Grande Village.

Consequences

a. Recreational Values - Management of recreation and access points would continue to be inconsistent. Depending upon the management approach, one or more access points could be altered to meet a perceived immediate or long-term need, affecting the recreational opportunities associated with the access points.

Since access points in the park are not officially designated, a policy to enforce the prohibition against launching of motorized watercraft from undesignated sites would reduce the recreational opportunities for motorized boat users in the park.

Should the present access points across private properties outside the park be lost, recreational opportunities within the Park would be greatly diminished.

The lack of restroom and trash receptacles at launch sites above Santa Elena and below Boquillas canyons would continue to be an inconvenience to recreational users.

b. Wildlife and Fish - Access points would continue to facilitate the use of motorized watercraft, which are primarily used for fishing. Effects upon fish populations would continue.

c. Aesthetic Values - The lack of toilet and refuse disposal facilities may degrade area aesthetics in terms of litter but may improve aesthetics with reduced development.

d. Social and Economic Values - No action could result in the loss of public access above Santa Elena and below Boquillas canyons, which would cause a severe economic hardship on the local communities.

3. Alternative 3: Increase Development - This alternative includes all existing and proposed access locations and facilities and actions identified in the proposed action with the following changes: in-park developed sites accessed by paved roads would have hardened boat ramps suitable for backing trailers into the water. Each site would have telephone service.

Primitive access locations would have a dirt or gravel ramp to the water's edge. In addition to Talley and Solis, primitive access would be provided at Cottonwood Campground and near Reed Camp and Casa de Piedra. Toilet and trash receptacles would be provided at all primitive and developed sites.

Consequences

a. Recreational Values - Impacts under this alternative would be the same as under the proposed action. Additionally, the launching and take-out of motorized crafts would be significantly improved, and those actions for non-motorized crafts would be somewhat improved, increasing recreational opportunities for both user groups and the mobility impaired.

b. Wildlife and Fish - The development, improvement, and increased use of access sites may have a negative impact upon the wildlife in the immediate area. Increased use of the river due to these improvements may have a negative impact upon wildlife in the river corridor. Increased fishing due to these improvements would have a negative impact upon the fish.

c. Floodplain (Riparian) Resources - The development of new launch sites and improvement of established access points would result in the

destruction of riparian vegetation and disturbance of the soils in their immediate vicinity.

d. Wild and Scenic River Values - Some degradation of scenic values and the undeveloped character of the river will occur should access points at Talley, Solis, Casa de Piedra and Rio Grande Village be improved. The addition of restrooms and trash facilities at these sites will detract from the primitive values of these areas. These developments are in keeping with the definition of scenic under the Wild and Scenic Rivers Act.

e. Aesthetic Values - The development of launch sites could detract from area aesthetics, especially if not done in a complementary manner. However, the provision for trash and human waste collection will improve the aesthetics within a short distances of these sites.

f. Social and Economic Values - The development and improvement of access sites could increase the economic opportunities available to commercial outfitters by making currently unused areas easier to access and by making currently used access points more convenient. The improvement, development, and maintenance of current and additional access points would place additional strain on the park's budget.

F. Human Waste

1. Proposed Action - All solid human waste will be carried out with two exceptions. These exceptions include a) private or commercial use between the Santa Elena take-out and Talley and between Solis and the entrance to Boquillas Canyon; and b) kayak only or single canoe trips. River toilets must be compatible with septic system disposal, except for users of the Santa Elena dump station. The Service will develop two disposal sites: one for west-bound users and one for north-bound users at either Panther Junction or Persimmon Gap.

Consequences

a. Recreational Values - Recreational users would have the additional requirement of obtaining and using a toilet or changing their plans to use a river segment not requiring solid human waste carry-out. Users would have to haul, set up, and empty a toilet. The Service will publicize this information and other boating requirements to inform the public.

b. Cultural Resources - Eliminating the practice of digging holes to bury human waste could prevent buried cultural materials from being disturbed.

c. Floodplain (Riparian) Resources - Floodplain vegetation and soils would be protected by eliminating the practice of digging holes to bury human waste.

d. Aesthetic Values - A required carry-out system would result in less toilet paper and unburied human waste impinging upon the aesthetic values of the various camping and lunch stops and other often visited areas in the river corridor. Dumping the toilet will be an aesthetically unappealing task. Some people may even find using a toilet an aesthetically unappealing task.

e. Social and Economic Values - Requiring toilets will result in an expense on those boaters having to buy or rent the toilets. Local vendors of toilets would benefit.

f. Water Quality - Carry-out systems should help preserve water quality, especially at the heavily

visited camp sites, lunch stops, and other visited places in the river corridor.

2. Alternative 2: No Action - This alternative maintains conditions as currently exist. Commercial users have voluntarily carried-out solid human waste for years. Since 1994, they have been required in their authorizations to carry it out for both day and overnight trips. Private trips are not required to carry out solid human waste. Plastic bags are no longer allowed; only paper bags can be disposed of in the waste disposal system at the Santa Elena take-out.

Consequences

a. Recreational Values - Private users would not have to use toilets, but commercial groups would continue to carry out solid human waste.

b. Cultural Resources - The current method of digging cat-holes to bury human waste may result in buried cultural materials being disturbed.

c. Floodplain (Riparian) Resources - Floodplain vegetation and soils may be disturbed by burying human waste.

d. Aesthetic Values - The continued impacts of unburied human waste and toilet paper litter will reduce aesthetic values of the river corridor. This will worsen should use increase.

e. Social and Economic Values - Private users would experience no change, but commercial outfitters would have to purchase bagless system to carry out solid human waste.

f. Water Quality - Water quality could deteriorate due to improperly buried solid human waste contamination.

3. Alternative 3: Exempt Private Users from Carry-Out Policy at Specific Times - Under this alternative, the proposed action is adopted except private trips will not be required to carry out their solid human waste from any section of the river during the relatively low use period between June 1 and November 15. They will be required to carry out their solid human waste the remainder of the year.

Accumulations of waste and toilet paper could be expected to be relatively low during this time period due to the historically lower use. Although all commercial operators will have the necessary toilet systems to carry out solid human waste, not all private boaters will. This alternative provides an opportunity for private users to visit the canyon segments of the river without being required to use a toilet system.

Consequences

a. Recreational Values - Those who feel burdened by the toilet requirement will have an opportunity to visit the canyon sections of the river without a toilet system. Users who want to boat between November 16 and May 30 will have to acquire and use a toilet. Commercial outfitters will continue to provide toilets.

b. Cultural Resources - The digging of cat-holes between June 1 and November 15 may disturb buried cultural materials.

c. Floodplain (Riparian) Resources - Floodplain vegetation and soils might be disturbed by digging holes during the period toilets are not required.

d. Aesthetic Values - Unburied human waste and toilet paper litter, when toilets are not required, may occur and reduce aesthetics.

e. Social and Economic Values - Users between November 16 and May 30 will incur a one-time expense of having to buy or rent the toilets.

f. Water Quality - There may be some degradation of water quality during the period when toilets are not required but it should be minimal, due to the low use during that period.

G. Recreational Use Limits

1. Proposed Action - In **threshold** river segments, no commercial company, group, or trip may exceed 30 persons, excluding commercial guides each day. For the Santa Elena canyon segment, six commercial companies, five private trips, and one special use trip may launch each day. For the Santa Elena take-out to Cottonwood Campground and La Clocha to Boquillas Canyon Entrance segments, four commercial companies, one special use group, and twelve private trips may launch each day. For the Cottonwood Campground to Reed Camp and the Solis to La Clocha segments, three commercial companies, one special use group, and eight private trips may launch each day.

In **primitive** river segments, no commercial company, group, or trip may exceed 20 persons, excluding commercial guides each day. For the Talley to Solis segment, one commercial company (either day or night or combination), one commercial company (day trip only), and three private trips may launch each day. One special use trip may launch per week. For the Reed Camp to Talley segment, one commercial company, one special use group, and three private trips may launch each day.

In the **wild** zone, no commercial company, group, or trip may exceed 20 persons, excluding commercial guides each day. One commercial company and three private trips may launch each day. One special use group may launch per week.

Consequences

a. Recreational Values - Use limits for the respective river zones achieve the diversity of experiences described in the zoning issue while allowing a substantial number of users on the river each day.

Varied use limits accommodate a variety of user needs. Solitude can be found for those seeking it, and large group experiences will be available for those desiring them. Higher use limits in the threshold zones provide opportunities for users desiring a river trip regardless of the numbers of encounters with other users.

Use limits for the respective river zones may

disappoint some users who may not be permitted to launch according to their plans. Use limits may also preclude groups larger than 20 or 30 (depending upon the zone) from travelling together.

Controversies among competing user groups may occur. Various user groups may perceive that the Plan favors one group over another.

b. Wildlife and Fish - Disturbances to wildlife and fish will be reduced, particularly during periods of historically heavy use. Some areas or times may see increased disturbances between people, wildlife, and fish if use patterns change due to use limits.

c. Threatened and Endangered Species - The use limits should result in less disturbance to the peregrine falcon by controlling the number of people using the canyons on any given day and preventing unrestricted increases in use. The potential spread of use, due to use limits, to current low-use areas may result in increased activity in threatened cactus habitat.

d. Cultural Resources - The proposed use limits will prevent a general increase in vandalism and defacement of cultural resources by limiting the numbers of visitors using the river corridor at any particular time. Impacts to cultural resources in areas of current low use may increase as river users are shifted to less popular river segments during busy periods.

e. Floodplain (Riparian) Resources - Impacts due to trampling, erosion, and compaction of soils at camping and lunch sites will be limited or reduced in some areas but may increase in others.

Implementation of use limits may shift the impacts to periods and areas presently receiving low use. If total user numbers increase overall throughout the year, this may have a cumulative negative effect. If total user numbers remain steady, the distribution of use may allow for recovery of presently impacted sites.

f. Wild and Scenic River Values - The proposed use limits will help preserve a sense of primitive

America while allowing users to enjoy the scenic and recreational values associated with Wild and Scenic Rivers.

g. Aesthetic Values - Providing limits to use will help ensure that aesthetic values associated with the river are not overly degraded through uncontrolled use. Litter, human waste, trampling of vegetation, and erosion of soils will be limited by preventing unrestricted increases in recreational use during peak times. Restricted use limits in the primitive and wild zones will further enhance the protection of aesthetic values.

Some areas may see a decline in the aesthetic values associated with some river segments if use in them increases due to the limits placed on more popular segments.

h. Social and Economic Values - Establishing limits for the use of the various river zones will enhance social values for those seeking a specific social experience by providing the appropriate conditions to find that experience. It may also have a negative impact upon those who cannot enjoy their choice of river trips because use limits have been met.

Use limits may have a variety of effects upon economic values. There should be little change during the low use periods of the year. Commercial outfitters will probably see their economic gains limited during the busy periods. However, this may be offset by a shifting of use to less-busy periods and less-crowded river segments.

i. Water Quality - Use limits should not appreciably alter the overall water quality. Localized degradation of water quality due to human and other waste will be less likely if high use periods are controlled. Some areas may have a slight decrease in water quality if use limits result in less popular segments receiving increased use.

j. Air Quality - Use limits should not appreciably alter overall air quality. Localized degradation of air quality due to campfires or

motor emissions will be less likely if high use periods are controlled. Some areas may have a slight decrease in air quality if use limits result in less popular segments receiving increased use.

2. Alternative 2: No Action - Current river use management would continue. Each commercial company may launch 30 people, excluding commercial guides, per day on each river segment. Private parties may launch 30 people per group. No limit on the number of commercial companies or private parties that launch on any given river segment currently exists.

Consequences

a. Recreational Values - Users would always have access to the river. During busy periods, users may find the launch areas, river, and camp areas overly crowded due to uncontrolled numbers of trips. There would be no guarantee of an opportunity to experience solitude.

b. Wildlife and Fish - Current trends may lead to increasing pressures on wildlife and fish with unrestricted increases in use.

c. Threatened and Endangered Species - No action may lead to increasing pressure on peregrine falcons with unrestricted increases in use.

d. Cultural Resources - Cultural resources may suffer increased vandalism and defacement with unrestricted increases in use.

e. Floodplain (Riparian) Resources - Increased damage to floodplain resources due to trampling, erosion, and soil compaction may result if user numbers grow beyond current levels.

f. Wild and Scenic River Values - Unlimited launches may diminish the essentially primitive nature of Wild and Scenic Rivers. There would be no guarantee of solitude or a trip relatively free from human impacts.

g. Aesthetic Values - The aesthetic values associated with a river trip may be reduced if the number of river users in unlimited. Increased use should result in a less pristine scene.

h. Social and Economic Values - The potential for increased crowding exists with current conditions. This crowding may result in less-satisfying experiences for river users. Some large groups may prefer the relatively few limits offered in this alternative. Few people seeking river trips will be turned down due to a use limit being met. Local businesses and commercial river companies would probably realize unrestricted economic opportunities with the no action alternative.

i. Water Quality - Only slight changes to water quality will occur, except possibly at those sites where increasing use pressures may elevate adverse impacts such as human and other waste discharge into the river.

j. Air Quality - Little change in air quality will occur, except possibly at popular stops and camps, when fires smoke or motor exhaust may be noticeable for short periods of time, especially with unrestricted increases in use.

H. Cumulative Impacts

In addition to requiring that consequences of individual agency actions be assessed, the National Environmental Policy Act requires assessment of the cumulative effects of all actions. The following provides an assessment of all proposed actions and their expected consequences when considered as a whole.

The Service proposes managing segments of the river as one of three different zones. The zones (threshold, primitive, and wild) will provide for varied types of river experiences. Visitors will be able to plan trips for their expectations, which will have a high probability of being met through zone management.

Inter-canyon threshold river segments will be open to all types of watercraft with up to 60 horsepower motors throughout the entire year. Electric motors may be used in the threshold river segments, including Santa Elena Canyon, throughout the entire year. Santa Elena Canyon will be closed to all other motorized watercraft. Primitive and wild zones of the river corridor, including Mariscal and Boquillas canyons, will be closed to all motorized watercraft throughout the entire year.

Proposed fishing regulations will be implemented. Fishing and seining for bait minnows will be allowed on all portions of the Rio Grande, but not in any tributary, stream, spring or pond. A Park permit will be required, and State fishing regulations will apply. Twenty-five fish, per person, per day or in possession, will be the catch limit. The use of pole and line, rod and reel, hand line, and throw line will be allowed, but trot lines and jug fishing will not. Unattended throw lines must have an identification tag attached.

The Service will ensure access above and below the three major canyons and will strive to ensure access across private property at Lajitas and Heath Canyon. The Service will provide developed access at the Santa Elena take-out and Rio Grande Village. Primitive access will be provided at Talley, Solis, and Cottonwood Campground. If needs arise, a developed access will be provided near Reed Camp and a primitive access will be provided near Case de Piedra. Toilets and trash receptacles will be provided at developed access points within the park reached by paved roads. The Service will seek ways to provide them at Lajitas and Heath Canyon, but will provide no other facilities at other access points.

All solid human waste will be carried out except for a) private or commercial use between the Santa Elena take-out and Talley and between Solis and the entrance to Boquillas Canyon and b) kayak only or single canoe trips. Systems must be compatible with septic system disposal. The Service will develop disposal sites for west-side users and either Panther Junction or Persimmon Gap.

No commercial company, group, or trip may exceed 30 persons, excluding commercial guides, in the threshold river segments. No commercial company, group, or trip may exceed 20 persons in the primitive and wild river segments. The number of launches on each river segment will be limited.

Consequences -

1. Recreational Values - The proposed action formalizes and preserves current recreational use patters. River users will be able to plan trips around expected values and have their trips meet those expectations. River management will provide a diverse range of experiences from the high probability of encountering other parties to a wilderness experience with the opportunity for solitude. Motor use for recreational boating in Mariscal and Boquillas canyons will be eliminated, but the use of electric motors in Santa Elena Canyon will be increased from six months to the entire year. Fishing as a recreational use will be preserved, although trot lines and jug fishing will be excluded as acceptable fishing methods. Groups will be required to get a Park permit and to place identification markers on throw lines. Developed and primitive access to the river would remain basically the same, but two new sites in the inter-canyon river segments, may be developed. The commitment to provide for public access above Santa Elena Canyon and below Boquillas Canyon would ensure that recreational opportunities remain. Required carry-out systems for solid human waste will place the additional burden of acquiring a toilet system upon users arriving in the park without one. Use limits will achieve the diversity of experiences as described in the zoning issue. Use limits will accommodate recreational needs and preserve a diversity of recreational opportunities based upon the type of desired experience. Some users may not realize their expectations by having to change from their plans when river segments are full.

2. Wildlife and Fish - Zoning will prevent unrestricted future use, so current conditions for

wildlife and fish will be preserved throughout the majority of the year and enhanced during high use periods. Disturbance to wildlife populations from noise, wake action, or fuel leaks generated by motorized watercraft would be eliminated in the wild and primitive zones and Santa Elena Canyon. The use of fish as the sole consumable wildlife resource would continue, but the permit requirement would allow the Service to begin gathering fishing distribution, density, and intensity data.

3. Threatened and Endangered Species - Zoning and implementation of use limits will preserve current conditions by preventing unrestricted increases in use. Conditions for the peregrine falcon should be enhanced during the critical nesting period. Peregrine falcons would be free of disturbance from noise-producing engines within the three major canyons. Restrictions against catching from or releasing into tributary streams and springs protects the endangered Big Bend gambusia and other rare species, which use or may use tributary streams.

4. Cultural Resources - Disturbances to cultural features will remain illegal. Preventing unrestricted increased use will result in greater future protection. Eliminating the practice of digging holes to bury human waste may prevent buried cultural materials from being disturbed.

5. Floodplain (Riparian) Resources - Lunch sites, paths to and from points of interest, and campsites will continue to be used, but future increases will be restricted. Motorized watercraft restrictions within primitive and wild zones will eliminate wave action erosion, but displaced use in the threshold zone may increase. The development of new launch sites would result in the destruction of riparian vegetation at specific sites but would channel use to the designated areas. Floodplain vegetation and soils may be protected by eliminating the practice of digging holes to bury human waste.

6. Wild and Scenic River Values - Zoning and use limits will enhance the preservation of a primitive experience as identified in the Wild and Scenic Rivers Act by restricting future use. The proposed action for motorized watercraft will limit an historic activity, motorized use, within the wild and primitive zones. Protection of fish and wildlife contributes to the

primitive values associated with wild and scenic rivers. Short-term existence of native fish populations would probably not be threatened by the implementation of the proposed action. Fishing use data, along with aquatic resource monitoring, would assist in identifying fishing-related threats, should these data become available.

7. Aesthetic Resources - Aesthetic values will be preserved by restrictions on increased future growth. Any noise, echoes, and vibrations associated with motorized use within the canyons will be eliminated, which will enhance aesthetic resources in those locations and protect solitude and tranquility. The aesthetic values of fishing would be preserved. Aesthetic degradation from visual remnants of fishing would be minimized by the restriction against jug fishing and trot lines. The development of toilet and trash facilities above Santa Elena Canyon and below Boquillas Canyon would detract from the site aesthetics but would also improve aesthetics through the reduction of litter. Required carry-out of solid human waste would result in less toilet paper and unburied human waste at various camping and lunch stops.

8. Social and Economic Values - Zoning and use limits will provide for a wider variety of experiences. Opportunities will exist for those travelling in large groups and those seeking solitude. Commercial outfitters will experience reduced opportunities for growth because of the establishment of use limits. The elimination of motorized watercraft in the primitive and wild zones is consistent with wild and primitive experiences and expectations of river users, except for the small population that uses motorized watercraft. Securing public access above Santa Elena Canyon and below Boquillas Canyon will ensure the economic continuation of river use for the local communities.

9. Water Quality - No solid documentation exists about recreational river users' effects upon the water quality. Limited knowledge exists about the effect of motor use upon water quality, especially with contemporary refinements and regulations upon small motors. Water quality values should be enhanced by the elimination of gas motors in specified segments. Carry-out systems for solid human waste should also enhance water quality.

10. Air Quality - No documentation exists about recreational river users' effects upon the overall air quality. Although some current research has focussed upon small combustion motors and air pollution, limited knowledge is available, especially within constricted canyon environments. If anything, the elimination of motorized watercraft from certain river segments would improve air quality. There will continue to be negligible effects of campfire smoke.

Appendix 1. Number of river users compared to total park visitation.

	1992	1993	1994
number of visitors	296,899	330,271	332,781
commercial river users	8,249	7,785	9,643
private river users	2,299	2,255	2,368

Appendix 2. All River Permits by Year for Private and Commercial Boaters

	Private	Commercial	Total
1983	1025	360	1385
1984	1025	777	1997
1985	1651	900	2551
1986	1301	759	2061
1987	817	685	1502
1988	1032	697	1729
1989	607	726	1333
1990	412	748	1160
1990	484	771	1255
1990	772	712	1483
1993	529	959	1448
1994	633	1113	1746

Appendix 3. Permits Issued by Canyon for 1990, 1991, 1992

SANTA ELENA CANYON
1990

Date	Comm. Over.	Pri. Over.	Total Overnight	Comm. Day	Pri. Day	Total Day-Use	Total
101			1				1
102							
103			2				2
104			1				1
105			1				1
106							
107							
108						1	1
109							
110							
111							
112							
113							
114							
115							
116							
117							
118						1	1
119							
120							
121							
122							
123						1	1
124			1				1
125			1				1
126						1	1
127							
128			1				1
129			1			1	2
130			2			1	3
131							
201							
202							
203							
204						1	1
205						1	1
206							
207						1	1

Santa Elena Canyon - 1990

208			2			2	4
209			1				1
210							
211						1	1
212							
213							
214			1				1
215							
216							
217			2				2
218						1	1
219							
220							
221							
222							
223			2				2
224							
225			1				1
226						3	3
227						4	4
228			2			3	5
301						2	2
302	1	1	2	2		2	4
303		1	1				1
304							
305				2		2	2
306		1	1	2		2	3
307	1	1	2	2		2	4
308				2		2	2
309	1		1	1		1	2
310		1	1	3		3	4
311	4	2	6	1		1	7
312		2	2	1		1	3
313	2	3	5	3		3	8
314	1		1	2		2	3
315				3		3	3
316	4		4	2		2	6
317				4		4	4
318	3		3	1	1	2	5
319	3	1	4	4	1	5	9
320	3		3	4		4	7
321				3		3	3
322	1	2	3	2		2	5
323				1	2	3	3
324	2	1	3	1		1	4
325	1	3	4				4
326	1	1	2	3	1	4	6
327		2	2	2		2	4

Santa Elena Canyon - 1990

328				3		3	3
329	1		1	3	1	4	5
330	1	3	4	3		3	7
331	1	2	3	3	1	4	7
401	1		1	1		1	2
402	1		1	3		3	4
403	2		2	3		3	5
404				3		3	3
405	2		2	2		2	4
406	2	1	3	2	1	3	6
407		2	2	2	1	3	5
408		2	2	2		2	4
409	2	2	4	3	1	4	8
410	1	1	2	3		3	5
411	3		3	2		2	5
412				2		2	2
413	1	4	5	1	1	2	7
414		2	2	1		1	3
415				2		2	2
416			2			2	4
417			1			2	3
418			1			2	3
419						2	2
420			3			1	4
421						2	2
422						1	1
423			2			2	4
424			2			3	5
425						3	3
426			1			2	3
427			3			3	6
428			3			4	7
429			2			2	4
430						2	2
501			1			3	4
502			1			2	3
503						2	2
504			3			1	4
505			4			2	6
506			2			4	6
507			2			3	5
508			1			1	2
509			1			1	2
510						3	3
511			2			2	4
512			4			2	6
513						1	1
514			1			4	5

Santa Elena Canyon - 1990

515			2			1	3
516			2			2	4
517			1			2	3
518			2			1	3
519			4			2	6
520						2	2
521			2			2	4
522			2			3	5
523			1			2	3
524						2	2
525	2		2	2	1	3	5
526	3	1	4	2		2	6
527	2	1	3	1	1	2	5
528	2		2	2		2	4
529						2	2
530						3	3
531			1			2	3
601			1			1	2
602			1			1	2
603			1			2	3
604			1			1	2
605			1			1	2
606			1			1	2
607			2			1	3
608			2			2	4
609			3			2	5
610							
611			1			2	3
612			1			2	3
613						2	2
614						1	1
615			2				2
616			2				2
617							
618			1				1
619			1				1
620							
621			1				1
622							
623			2			1	3
624							
625			1				1
626							
627			1				1
628							
629			1				1
630							
701			1				1

Santa Elena Canyon - 1990

702	1		1
703			
704			
705			
706			
707			
708			
709			
710			
711			
712			
713			
714			
715		1	1
716		1	1
717			
718		2	2
719		2	2
720		2	2
721		1	1
722		1	1
723	1	1	2
724		2	2
725			
726			
727			
728		1	1
729		1	1
730		2	2
731	1	1	2
801			
802			
803			
804			
805			
806	1	1	2
807		1	1
808			
809		1	1
810	1		
811			
812		1	1
813		1	1
814		1	1
815			
816			
817			
818	2	1	3

Santa Elena Canyon - 1990

819	1		1
820			
821	1		1
822		1	1
823	1	1	2
824		2	2
825		1	1
826		2	2
827	1	1	2
828		1	1
829		1	1
830	1		1
831		3	3
901	6	2	8
902		3	3
903		2	2
904	1		1
905			
906		2	2
907	1	2	3
908	1	1	2
909	2	1	3
910	1	2	3
911	1	3	4
912		2	2
913		1	1
914	1	2	3
915	1	2	3
916		1	1
917		1	1
918	2	1	3
919		1	1
920	2	2	4
921	1	2	3
922	2	2	4
923			
924		1	1
925		1	1
926		1	1
927		1	1
928	2	3	5
929	1	1	2
930		1	1
1001		1	1
1002		2	2
1003			
1004			
1005	1		1

Santa Elena Canyon - 1990

1006			1		4	5
1007					2	2
1008			1		2	3
1009					2	2
1010			2		3	5
1011					1	1
1012					3	3
1013			1		3	4
1014					2	2
1015					1	1
1016			2		2	4
1017			1		1	2
1018			1		2	3
1019			3		2	5
1020			2		1	3
1021					1	1
1022					2	2
1023			2		2	4
1024			2		2	4
1025					3	3
1026			1		2	3
1027			2		2	4
1028					2	2
1029			1		1	2
1030			1		4	5
1031			1		1	2
1101			2		2	4
1102			2		3	5
1103			2		2	4
1104						
1105			2		3	5
1106			1		2	3
1107					1	1
1108			2			2
1109			1		1	2
1110			3		2	5
1111					1	1
1112						
1113					2	2
1114			2		3	5
1115			1			1
1116			3		2	5
1117					2	2
1118			2		1	3
1119			2		3	5
1120			1		3	4
1121	1	1	2	2	2	4
1122	5	2	7			7

Santa Elena Canyon - 1990

1123	3	4	7	2	2	9
1124		5	5	3	3	8
1125				2	2	2
1126			1		2	3
1127			1		2	3
1128						
1129					1	1
1130			1		1	2
1201					1	1
1202					1	1
1203						
1204			1		1	2
1205			1			1
1206			2			2
1207						
1208			1			1
1209					1	1
1210						
1211						
1212						
1213					1	1
1214						
1215						
1216			1		2	3
1217			2			2
1218			1			1
1219			1		1	2
1220					1	1
1221						
1222						
1223			1			1
1224					3	3
1225					1	1
1226			2		1	3
1227			1		3	4
1228			5		2	7
1229			1		2	3
1230			1		3	4
1231			2		1	3

SANTA ELENA CANYON
1991

Date	Comm. Over	Pri. Over	Total Overnight	Comm. Day	Pri. Day	Total Day-Use	Total
101						2	2
102			3				3
103						2	2
104			1			3	4
105							
106						1	1
107						1	1
108							
109						2	2
110						1	1
111			1			2	3
112			1			1	2
113							
114						2	2
115							
116						1	1
117							
118						1	1
119			1				1
120							
121							
122							
123						1	1
124							
125							
126							
127						1	1
128			1				1
129						1	1
130						1	1
131							
201						1	1
202			1			1	2
203						1	1
204						2	2
205						1	1
206						3	3
207						1	1
208							
209						3	3
210			1			2	3
211			1			1	2

Santa Elena Canyon - 1991

212			2				2
213						3	3
214			1			4	5
215						1	1
216							
217						4	4
218							
219			1			2	3
220			1			2	3
221						1	1
222							
223						2	2
224			2			1	3
225						2	2
226			2			2	4
227						1	1
228						1	1
301	1	1	2	2		2	4
302	1		1	4		4	5
303	1		1	1		1	2
304	1		1	1		1	2
305				3		3	3
306	1		1	2		2	3
307	1		1	2		2	3
308				2			2
309	4		4	3	1	4	8
310		3	3	3		3	6
311		1	1	3		3	4
312	4	1	5	3		3	8
313	1		1	3		3	4
314				2	2	4	4
315		1	1	2		2	3
316	1		1	2	1	3	4
317	2		2	2		2	4
318	1		1	4	1	5	6
319	3	1	4	2		2	6
320	1		1	3		3	4
321	3		3	2		2	5
322	1		1	4		4	5
323	4	1	5	3		3	8
324	1	1	2	3		3	5
325	4	2	6	3		3	9
326	3	1	4	5		5	9
327	4	1	5	2		2	7
328	2	1	3	3	1	4	7
329	2	1	3	3		3	6
330		1	1	3	1	4	5
331		1	1	3		3	4

Santa Elena Canyon - 1991

401				3	3	3
402	2	1	3	2	2	5
403				3	3	3
404	1		1	3	3	4
405	1		1	3	3	4
406	2		2	4	4	6
407	1		1	1	1	2
408	2		2	2	2	4
409	4		4	5	5	9
410	3		3	2	2	5
411	1		1	4	4	5
412	3		3	3	3	6
413	2		2	3	3	5
414				2	2	2
415	1		1	4	4	5
416					4	4
417			1		4	5
418			3		3	6
419			4		2	6
420			3		3	6
421			1		4	5
422			2		1	3
423					1	1
424						
425						
426						
427						
428						
429						
430						
501						
502						
503						
504						
505						
506						
507						
508						
509						
510						
511						
512						
513						
514						
515						
516						
517						
518						

Santa Elena Canyon - 1991

519
520
521
522
523
524
525
526
527
528
529
530
531
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
701
702
703
704
705

Santa Elena Canyon - 1991

706			
707			
708			
709			
710			
711			
712			
713	1		1
714			
715			
716			
717			
718	1		1
719			
720			
721		1	1
722		1	1
723	1	1	2
724		1	1
725		3	3
726	1	1	2
727	1	2	3
728	1	1	2
729		2	2
730		1	1
731		1	1
801		2	2
802	3	2	5
803	1	5	6
804		2	2
805		1	1
806		2	2
807	3	2	5
808		2	2
809	2	3	5
810	2	2	4
811	2	1	3
812	2	2	4
813	1	1	2
814		1	1
815			
816		2	2
817	1	1	2
818		1	1
819	2	1	3
820		1	1
821		1	1
822		2	2

Santa Elena Canyon - 1991

823		1	1
824	1	2	3
825		1	1
826			
827		1	1
828		1	1
829		2	2
830	1	2	3
831	5	2	7
901	1	2	3
902	1	1	2
903	2	2	4
904	3	2	5
905		2	2
906	1	2	3
907			
908	1	2	3
909	1		1
910			
911	1	1	2
912			
913	1	1	2
914	1	2	3
915	2	1	3
916	1		1
917		2	2
918			
919			
920		1	1
921		1	1
922		1	1
923		2	2
924	2		2
925		1	1
926		2	2
927		3	3
928		2	2
929		1	1
930	1	1	2
1001	1	1	2
1002		2	2
1003		2	2
1004	2	2	4
1005		2	2
1006	1	2	3
1007		1	1
1008	1	2	3
1009		2	2

Santa Elena Canyon - 1991

1010		2	2
1011	3	3	6
1012	4	3	7
1013	3	4	7
1014		4	4
1015	1	1	2
1016	1	2	3
1017	1	2	3
1018	3	2	5
1019	2	2	4
1020	1		1
1021	2	1	3
1022		1	1
1023	1	1	2
1024			
1025	4		4
1026	1	1	2
1027		1	1
1028	2	1	3
1029	1	3	4
1030		2	2
1031	3	2	5
1101	2	2	4
1102		2	2
1103		1	1
1104			
1105	2	1	3
1106	3	2	5
1107		2	2
1108	1	2	3
1109	1	2	3
1110	1	1	2
1111	1		1
1112		2	2
1113	1	1	2
1114	2		2
1115	1	1	2
1116	2	1	3
1117			
1118		1	1
1119			
1120			
1121			
1122	2		2
1123	4		4
1124		2	2
1125	3		3
1126	2		2

Santa Elena Canyon - 1991

1127					
1128	7	7	1	1	8
1129	1	1			1
1130			1	1	1
1201					
1202					
1203					
1204					
1205				1	1
1206					
1207					
1208					
1209		1			1
1210					
1211					
1212					
1213		1			1
1214					
1215					
1216					
1217					
1218		2			2
1219					
1220					
1221					
1222					
1223		2		1	3
1224					
1225					
1226				1	1
1227		1		3	4
1228		2		2	4
1229		4		4	8
1230		2		2	4
1231				2	2

SANTA ELENA CANYON
1992

Date	Comm. Over.	Pri. Over.	Total Overnight	Comm. Day	Pri. Day	Total Day-Use	Total
101			1			1	2
102			2				2
103			1			3	4
104			1			1	2
105			2			1	3
106			1				1
107							
108							
109							
110							
111							
112			1				1
113							
114			1				1
115							
116			1				1
117							
118							
119							
120							
121							
122							
123							
124							
125							
126							
127							
128							
129							
130							
131							
201							
202							
203							
204							
205							
206							
207							
208							
209							
210							
211							
212							
213							
214							
215			2				2
216							
217							

Santa Elena Canyon - 1992

218							
219							
220							
221							
222							
223							
224							
225							
226						1	1
227			1			1	2
228						3	3
229			1			2	3
301				2		2	2
302	2		2	3		3	5
303	1		1	3		3	4
304	1		1	2		2	3
305				3		3	3
306				3		3	3
307	2		2	3		3	5
308	1		1	3		3	4
309	2	2	4	2		2	6
310	1	4	5	2		2	7
311				3		3	3
312	1		1	3		3	4
313	1		1	3	2	5	6
314	2	14	16	2	4	6	22
315	4	3	7	3		3	10
316	3	6	9	3	2	5	14
317	3	15	18	3	7	10	28
318	3		3	4		4	7
319	1		1	3		3	4
320	3	4	7	2	4	6	13
321	2	4	6	2	2	4	10
322	2	4	6	2		2	8
323	3	2	5	2		2	7
324	1		1	3		3	4
325	2	3	5	1		1	6
326	1	4	5	2		2	7
327	1	3	4	2	1	3	7
328	2	3	5	2		2	7
329	4		4	2		2	6
330		1	1	1		1	2
331	2		2	1	3	4	6
401		3	3	1		1	4
402		2	2	1		1	3
403	1	5	6	1	1	2	8
404				1	3	4	4
405	1	2	3				3
406	2		2	3		3	5
407				2		2	2
408	1	3	4	2		2	6
409	2	2	4	2		2	6
410		3	3	2		2	5
411	2	2	4	1		1	5

Santa Elena Canyon - 1992

412				2	2	2
413	2		2	2	2	4
414	2	2	4	3	3	7
415	1		1	2	2	3
416			6		1	7
417			12		7	19
418			8		4	12
419			1		2	3
420			2		2	4
421			2		2	4
422			1		2	3
423			2		2	4
424			4		2	6
425					1	1
426					2	2
427			2		1	3
428			2		2	4
429			1		2	3
430			1		2	3
501			2		1	3
502			1		3	4
503					1	1
504					1	1
505					4	4
506			1		3	4
507			2		3	5
508			1		2	3
509			3		1	4
510			1		2	3
511					2	2
512			2		2	4
513			1		2	3
514			2		2	4
515			1		2	3
516			2		2	4
517			2		1	3
518			1		2	3
519			2		2	4
520			1		1	2
521						
522						
523		2	2			2
524						
525	1	2	3	1	1	4
526			1		1	2
527						
528					1	1
529			4		1	5
530			7		1	8
531			1		1	2
601			1		2	3
602			1		1	2
603			1		1	2

Santa Elena Canyon - 1992

604		1	1
605	3	1	4
606		2	2
607		2	2
608	1	3	4
609	2	1	3
610	3	2	5
611		1	1
612	2		2
613	1	2	3
614	2	1	3
615	2	1	3
616	1	1	2
617		1	1
618	1	1	2
619		1	1
620	1	1	2
621		1	1
622		1	1
623	1		1
624	1		1
625			
626			
627	1	1	2
628		1	1
629		1	1
630			
701		1	1
702	1	1	2
703		1	1
704	2	1	3
705		1	1
706	1	1	2
707		1	1
708	1	1	2
709	1	1	2
710		1	1
711		1	1
712			
713		2	2
714	1	1	2
715		1	1
716		1	1
717	2	1	3
718	2	1	3
719		1	1
720		1	1
721	1	1	2
722	1	2	3
723	2	2	4
724		2	2
725	1	2	3
726			

Santa Elena Canyon - 1992

727	1		1
728	1		1
729	1	1	2
730		1	1
731		1	1
801		2	2
802	2	1	3
803	1		1
804	1		1
805	1	1	2
806	1	1	2
807		1	1
808	1	1	2
809	1	1	2
810	1	1	2
811		1	1
812		1	1
813		1	1
814	1	1	2
815	1	1	2
816	2	1	3
817	1	1	2
818	1	1	2
819			
820			
821			
822			
823			
824			
825		1	1
826			
827		1	1
828	1	1	2
829	1		1
830	1		1
831			
901		1	1
902		1	1
903	1	1	2
904		1	1
905	2	1	3
906	1	2	3
907		2	2
908		2	2
909	1	1	2
910		2	2
911	2	1	3
912		1	1
913	1	1	2
914	1	1	2
915	1	1	2
916	1	3	4
917	1	2	3

Santa Elena Canyon - 1992

918		1	1
919		2	2
920		2	2
921	1	2	3
922	1	1	2
923		2	2
924	1	2	3
925	3	2	5
926	1	1	2
927		1	1
928	2	1	3
929	1	2	3
930	1		1
1001	1	1	2
1002	1		1
1003	1	2	3
1004	1	1	2
1005	2	1	3
1006	2	2	4
1007	1	1	2
1008	2	1	3
1009	1	1	2
1010	1	3	4
1011	2	1	3
1012	2	2	4
1013		1	1
1014		2	2
1015	1	1	2
1016		2	2
1017		1	1
1018	2	1	3
1019		2	2
1020	1	1	2
1021	1	1	2
1022	1	2	3
1023	2	2	4
1024	2	2	4
1025			
1026	1	1	2
1027		1	1
1028	1	1	2
1029	1	2	3
1030		2	2
1031	1	2	3
1101	1	2	3
1102	1	1	2
1103		1	1
1104			
1105	2		2
1106	1		1
1107	1		1
1108	1	1	2
1109		1	1

Santa Elena Canyon - 1992

1110						1	1
1111						2	2
1112			1			2	3
1113						1	1
1114			1			4	5
1115			1			1	2
1116			1			2	3
1117			1			2	3
1118						2	2
1119						1	1
1120			2			1	3
1121			2			1	3
1122			1				1
1123			1			2	3
1124						2	2
1125	1		1	2		2	3
1126	2	4	6	1		1	7
1127	2		2	2	2	4	6
1128	1	1	2	1		1	3
1129				1		1	1
1130						1	1
1201			1			1	2
1202							
1203						1	1
1204							
1205							
1206							
1207							
1208							
1209							
1210			1				1
1211						1	1
1212			2				2
1213							
1214							
1215							
1216							
1217							
1218							
1219			1				1
1220			1				1
1221						1	1
1222						1	1
1223			1				1
1224						1	1
1225						1	1
1226							
1227							
1228							
1229							
1230							
1231							

MARISCAL CANYON
1990

Date	Comm. Over.	Pri. Over.	Total Overnight	Comm. Day	Pri. Day	Total Day-Use	Total
101			1				1
102							
103			1				1
104							
105							
106			1				1
107							
108							
109							
110							
111							
112							
113							
114			1				1
115							
116							
117							
118							
119							
120							
121							
122							
123							
124							
125							
126							
127							
128							
129							
130							
131							
201							
202							
203							
204							
205							
206							
207							
208							
209							
210							
211			1				1
212							
213			1				1
214							
215						1	1
216			1				1
217							

Mariscal Canyon - 1990

218			1			1
219					1	1
220						
221						
222						
223						
224						
225						
226						
227						
228						
301						
302						
303						
304						
305		1	1			1
306						
307						
308						
309						
310		1	1			1
311						
312						
313						
314				1	1	1
315						
316						
317						
318						
319						
320						
321						
322	1		1			1
323	1	1	2			2
324		1	1			1
325		1	1			1
326		2	2			2
327		1	1			1
328						
329		1	1			1
330		1	1			1
331		1	1			1
401						
402						
403				1	1	1
404		1	1			1
405						
406		1	1			1
407	1	2	3			3
408		1	1			1
409	1	1	2			2
410						
411				1	1	1

Mariscal Canyon - 1990

412						
413	2		2			2
414		2	2			2
415				1	1	1
416			1		1	2
417						
418						
419						
420			1		1	1
421			1		1	2
422						
423						
424						
425						
426						
427						
428			1			1
429						
430						
501						
502						
503						
504						
505			1			1
506			1			1
507			1			1
508						
509			1			1
510						
511						
512						
513						
514						
515						
516						
517						
518						
519						
520			1			1
521						
522						
523						
524						
525						
526	1	1	2			2
527						
528						
529						
530						
531						
601			1			1
602						
603						
604						

Mariscal Canyon - 1990

605				
606				
607				
608				
609			1	1
610				
611				
612				
613				
614				
615				
616				
617				
618				
619				
620				
621				
622				
623				
624				
625			1	1
626				
627				
628				
629				
630				
701				
702				
703				
704				
705			1	1
706				
707				
708		1		1
709				
710		1	1	2
711				
712				
713				
714		2		2
715				
716				
717				
718				
719				
720				
721				
722				
723				
724				
725				
726				
727				
728				

Mariscal Canyon - 1990

729		
730		
731		
801		
802		
803		
804		
805		
806		
807		
808		
809		
810		
811		
812		
813		
814		
815		
816		
817		
818		
819	1	1
820		
821		
822		
823		
824		
825		
826		
827		
828		
829		
830		
831		
901		
902	1	1
903		
904		
905		
906		
907		
908		
909		
910		
911		
912		
913		
914		
915		
916		
917		
918		
919		
920		

Mariscal Canyon - 1990

921				
922				
923				
924				
925				
926				
927				
928				
929				
930				
1001				
1002				
1003				
1004				
1005		1		1
1006				
1007				
1008				
1009				
1010				
1011				
1012				
1013				
1014				
1015				
1016				
1017				
1018				
1019				
1020				
1021				
1022				
1023				
1024				
1025				
1026				
1027				
1028				
1029				
1030				
1031				
1101				
1102		1		1
1103		1		1
1104				
1105				
1106		1		
1107				1
1108				
1109		1		
1110		1		1
1111			1	1
1112				
1113		2		2

Mariscal Canyon - 1990

1114						
1115						
1116						
1117			1		1	2
1118			2			2
1119						
1120			1			1
1121		1	1	1	1	2
1122		1	1			1
1123						
1124		1	1	1	1	2
1125	1		1			1
1126			1			1
1127						
1128						
1129						
1130						
1201						
1202						
1203						
1204						
1205						
1206						
1207						
1208						
1209						
1210						
1211			1			1
1212						
1213						
1214						
1215						
1216						
1217						
1218						
1219						
1220						
1221						
1222						
1223						
1224						
1225						
1226			3		1	4
1227			1		1	2
1228						
1229			1			1
1230			1			1
1231						

MARISCAL CANYON
1991

Date	Comm. Over.	Pri. Over.	Total Overnight	Comm. Day	Pri. Day	Total Day-Use	Total
101							
102							
103							
104							
105							
106							
107							
108							
109							
110							
111			1				1
112			1				1
113							
114							
115							
116							
117							
118							
119							
120							
121							
122							
123			1				1
124							
125							
126							
127							
128							
129							
130							
131							
201			1				1
202							
203							
204							
205							
206							
207							
208							
209							
210							
211							
212							
213							
214						1	1
215							
216							
217							

Mariscal Canyon - 1991

218							
219							
220							
221							
222							
223			3				3
224							
225							
226							
227							
228							
301							
302		1	1	1		1	2
303							
304				1		1	1
305	1		1				1
306				1		1	1
307							
308				1		1	1
309		2	2	1	2	3	5
310	1	2	3		1	1	4
311		2	2				2
312					1	1	1
313							
314							
315	1		1	1	1	2	3
316	1	1	2				2
317	1	2	3				3
318		2	2		1	1	3
319							
320		1	1		1	1	2
321	1		1		1	1	2
322							
323		2	2		1	1	3
324	1	1	2				2
325	1	1	2		1	1	3
326							
327	1	1	2				2
328							
329					1	1	1
330	1		1				2
331							
401							
402							
403							
404							
405		1	1				1
406							
407	1		1				1
408							
409							
410							
411		1	1		1	1	2

Mariscal Canyon - 1991

412		1	1			1
413				1	1	1
414				1	1	1
415	1		1			1
416						
417						
418						
419						
420						
421			1			1
422						
423			1			1
424						
425						
426						
427						
428						
429						
430						
501						
502						
503						
504						
505						
506						
507						
508						
509						
510						
511						
512						
513						
514						
515						
516						
517						
518						
519						
520						
521						
522						
523						
524						
525						
526						
527						
528						
529						
530						
531						
601						
602						
603						

Mariscal Canyon - 1991

604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726

Mariscal Canyon - 1991

727		
728		
729		
730		
731		
801		
802		
803		
804		
805		
806		
807		
808		
809		
810	1	1
811		
812		
813		
814		
815		
816		
817	1	1
818		
819		
820		
821		
822		
823		
824		
825		
826		
827		
828		
829		
830	1	1
831		
901		
902		
903	1	1
904		
905		
906		
907		
908		
909		
910		
911		
912		
913		
914		
915		
916		
917		

Mariscal Canyon - 1991

918				
919				
920				
921				
922				
923				
924				
925		1		1
926				
927				
928				
929				
930		1		1
1001		1		1
1002				
1003				
1004				
1005				
1006				
1007				
1008				
1009				
1010				
1011				
1012				
1013				
1014				
1015				
1016		1		1
1017				
1018		1		1
1019				
1020				
1021				
1022				
1023				
1024				
1025				
1026			1	1
1027				
1028				
1029				
1030				
1031				
1101				
1102				
1103				
1104				
1105				
1106				
1107				
1108				
1109				

Mariscal Canyon - 1991

1110					
1111					
1112					
1113					
1114					
1115					
1116					
1117					
1118					
1119					
1120					
1121					
1122					
1123					
1124					
1125		1			1
1126					
1127					
1128					
1129			2	2	2
1130					
1201					
1202					
1203					
1204				1	1
1205				1	1
1206					
1207					
1208					
1209					
1210					
1211					
1212					
1213					
1214					
1215					
1216					
1217					
1218					
1219					
1220					
1221					
1222					
1223					
1224					
1225					
1226					
1227					
1228					
1229					
1230		2			2
1231					

MARISCAL CANYON
1992

Date	Comm. Over.	Pri. Over.	Total Over.	Comm. Day	Pri. Day	Total Day-Use	Total
101			1				1
102							
103						1	1
104							
105							
106							
107							
108							
109							
110							
111							
112							
113							
114							
115							
116							
117							
118							
119							
120							
121							
122							
123							
124			2				2
125							
126							
127							
128							
129							
130							
131							
201							
202							
203							
204							
205							
206							
207							
208							
209							
210			1				1
211							
212							
213							
214							
215							
216							
217							

Mariscal Canyon - 1992

218							
219							
220							
221							
222							
223							
224			1				1
225							
226							
227							
228							
301							
302							
303	1		1				1
304							
305							
306							
307		4	4				4
308		2	2				2
309							
310							
311							
312							
313				1		1	1
314		4	4				4
315	2	4	6				6
316		4	4		4	4	8
317	1		1				1
318							
319							
320					2	2	2
321		2	2		4	4	6
322	1	3	4		2	2	6
323	1	1	2				2
324		2	2		2	2	4
325							
326	1		1				1
327							
328							
329		3	3				3
330							
331							
401							
402		1	1				1
403	1		1				1
404							
405							
406							
407	1		1				1
408							
409				1		1	1
410							
411							
412							

Mariscal Canyon - 1992

413	1		1	1	1	1
414		3	3			3
415						
416			2		1	3
417			1			1
418			3			3
419						
420						
421						
422						
423						
424			1			1
425			2			2
426						
427					1	1
428						
429						
430						
501			1			1
502						
503						
504						
505						
506			3			3
507						
508						
509						
510						
511						
512						
513			2			2
514						
515						
516					4	4
517			2			2
518						
519			3		1	4
520						
521						
522						
523						
524						
525						
526						
527						
528						
529						
530						
531						
601						
602						
603						
604						

Mariscal Canyon - 1992

605			2	2
606			2	2
607				
608			1	1
609				
610				
611				
612				
613				
614				
615			1	1
616				
617				
618	2			2
619	2		2	4
620				
621				
622				
623				
624				
625				
626				
627				
628				
629				
630				
701				
702				
703	1			1
704				
705				
706				
707				
708				
709				
710				
711				
712				
713				
714				
715				
716				
717	1			1
718				
719				
720				
721				
722				
723				
724				
725				
726				
727				

Mariscal Canyon - 1992

728					
729					
730					
731					
801					
802					
803					
804					
805				1	1
806					
807					
808					
809					
810					
811					
812					
813					
814					
815					
816					
817					
818					
819					
820					
821					
822					
823					
824					
825					
826					
827					
828					
829					
830					
831					
901					
902					
903					
904					
905				1	1
906					
907		1			1
908					
909					
910					
911					
912					
913					
914					
915					
916					
917					
918					

Mariscal Canyon - 1992

919			
920			
921			
922			
923			
924			
925	1		1
926			
927			
928			
929			
930			
1001			
1002		1	1
1003			
1004			
1005			
1006			
1007			
1008			
1009			
1010	1		1
1011			
1012	1		1
1013			
1014	1		1
1015	1		1
1016			
1017			
1018			
1019			
1020			
1021			
1022			
1023			
1024			
1025	1		1
1026			
1027		2	2
1028			
1029			
1030	1	1	2
1031			
1101			
1102			
1103			
1104			
1105		1	1
1106			
1107		1	1
1108			
1109	1		1
1110			

Mariscal Canyon - 1992

1111					
1112					
1113					
1114		1		1	1
1115					
1116					
1117					
1118					
1119					
1120					
1121					
1122					
1123					
1124		1		1	2
1125			1	1	1
1126	3	3			3
1127	1	1		1	1
1128					
1129					
1130					
1201					
1202					
1203					
1204					
1205					
1206					
1207					
1208					
1209					
1210					
1211					
1212					
1213					
1214					
1215					
1216					
1217					
1218					
1219		1			1
1220					
1221					
1222					
1223					
1224					
1225					
1226					
1227					
1228					
1229		1			1
1230					
1231					

BOQUILLAS CANYON
1990

Date	Comm. Over	Pri. Over	Total Overnight	Comm. Day	Pri. Day	Total Day-Use	Total
101			1				1
102							
103			1				1
104							
105			1				1
106							
107							
108							
109			1				1
110							
111							
112							
113							
114							
115							
116							
117							
118							
119			1				1
120							
121							
122							
123							
124			1				1
125							
126							
127							
128							
129							
130							
131							
201							
202							
203							
204							
205							
206			1				1
207							
208							
209							
210							
211							
212							
213							
214			2				2
215							
216			1				1
217			1				1

Boquillas Canyon - 1990

218			2		2
219			1		1
220					
221					
222					
223					
224					
225					
226					
227					
228					
301					
302					
303					
304					
305		2	2		2
306					
307					
308					
309					
310		2	2		2
311					
312	1	2	3		3
313					
314					
315					
316					
317		1	1		1
318					
319					
320					
321					
322					
323					
324					
325		1	1		1
326		4	4		4
327		2	2		2
328	1	1	2		2
329		1	1		1
330					
331		1	1		1
401					
402					
403	1		1		1
404					
405		1	1		1
406					
407	1	1	2		2
408	1	1	2		2
409		2	2		2
410		1	1		1
411		2	2		2
412		2	2		2

Boquillas Canyon - 1990

413	1	1		1
414	3	3		3
415				
416				
417		2		2
418				
419				
420		1		1
421		1		1
422				
423		3		3
424				
425		1		1
426				
427		2		2
428		1		1
429		1		1
430		1		1
501				
502				
503		1		1
504		1		1
505		1		1
506				
507		1		1
508				
509				
510				
511		1		1
512				
513		1		1
514		1		1
515				
516				
517				
518		1		1
519				
520		1		1
521				
522				
523				
524				
525	2	2		2
526	2	2		2
527				
528				
529		1		1
530		1		1
531				
601				
602				
603				
604				

Boquillas Canyon - 1990

605		
606		
607		
608		
609		
610		
611		
612		
613		
614		
615		
616		
617		
618	1	1
619		
620		
621		
622		
623	1	1
624	1	1
625		
626		
627		
628		
629		
630		
701		
702		
703		
704		
705		
706		
707		
708		
709		
710		
711		
712		
713		
714		
715		
716		
717		
718		
719		
720		
721		
722		
723		
724		
725		
726		
727		

Boquillas Canyon - 1990

728		
729		
730		
731		
801		
802		
803		
804		
805		
806		
807		
808		
809		
810		
811		
812		
813		
814		
815		
816		
817		
818		
819		
820	1	1
821		
822		
823		
824		
825		
826		
827		
828		
829		
830		
831		
901	1	1
902	1	1
903		
904		
905		
906		
907		
908		
909		
910		
911	1	1
912		
913		
914	3	3
915		
916		
917	1	1
918		
919		

Boquillas Canyon - 1990

920		
921		
922	2	2
923	1	1
924		
925		
926		
927		
928	1	1
929		
930		
1001	1	1
1002		
1003	1	1
1004		
1005		
1006	2	2
1007		
1008		
1009		
1010		
1011		
1012		
1013	1	1
1014		
1015		
1016		
1017	1	1
1018	1	1
1019		
1020		
1021		
1022		
1023		
1024		
1025		
1026	2	2
1027		
1028	1	1
1029	1	1
1030		
1031		
1101		
1102		
1103		
1104		
1105		
1106	1	1
1107	1	1
1108		
1109		
1110		
1111		
1112	1	1

Boquillas Canyon - 1990

1113						
1114						
1115						
1116						
1117						
1118			2			2
1119			2			2
1120						
1121		1	1			1
1122		11	11			11
1123	1	2	3	1	1	4
1124						
1125						
1126			1			1
1127						
1128						
1129						
1130						
1201						
1202						
1203						
1204			1			1
1205						
1206						
1207						
1208						
1209						
1210						
1211						
1212						
1213			1			1
1214						
1215						
1216						
1217						
1218			1			1
1219						
1220			1			1
1221						
1222			1			1
1223						
1224						
1225						
1226			1			1
1227			1			1
1228			3			3
1229			1			1
1230						
1231			1			1

BOQUILLAS CANYON
1991

Date	Comm. Over.	Pri. Over.	Total Overnight	Comm. Day	Pri. Day	Total Day-Use	Total
101							
102			1				1
103							
104							
105							
106							
107							
108							
109							
110							
111							
112							
113			1				1
114							
115							
116							
117							
118							
119							
120							
121							
122							
123							
124							
125							
126							
127							
128							
129			1				1
130							
131							
201							
202							
203							
204			1				1
205							
206							
207							
208							
209							
210							
211							
212							
213							
214							
215			1				1
216							
217							

Boquillas Canyon - 1991

218				
219				
220				
221				
222			1	1
223			1	1
224				
225				
226				
227				
228			2	2
301		1	1	1
302				
303		1	1	1
304		1	1	1
305		1	1	1
306				
307				
308				
309		1	1	1
310		2	2	2
311		1	1	1
312		1	1	1
313		1	1	1
314		1	1	1
315				
316		3	3	3
317		3	3	3
318		3	3	3
319		1	1	1
320	1		1	1
321		3	3	3
322		1	1	1
323		1	1	1
324		3	3	3
325	1	3	4	4
326		3	3	3
327		1	1	1
328				
329		1	1	1
330				
331		1	1	1
401	1	1	2	2
402		1	1	1
403		2	2	2
404				
405		1	1	1
406				
407				
408				
409				
410		2	2	2
411		1	1	1
412		3	3	3

Boquillas Canyon - 1991

413	1	1	1
414	1	1	1
415			
416			
417			
418			
419			
420			
421			
422			
423			
424			
425			
426			
427			
428			
429			
430			
501			
502			
503			
504			
505			
506			
507			
508			
509			
510			
511			
512			
513			
514			
515			
516			
517			
518			
519			
520			
521			
522			
523			
524			
525			
526			
527			
528			
529			
530			
531			
601			
602			
603			
604			
605			

Boquillas Canyon - 1991

606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718 1 1
719
720
721
722
723
724
725
726
727
728
729

Boquillas Canyon - 1991

730				
731				
801				
802				
803				
804				
805				
806				
807				
808				
809				
810	1		1	2
811	1			1
812	1			1
813				
814				
815	1			1
816				
817				
818				
819	2			2
820				
821	1			1
822				
823				
824				
825				
826				
827				
828				
829				
830	1			1
831	2			2
901				
902				
903				
904				
905				
906				
907				
908				
909				
910	1			1
911				
912				
913				
914				
915				
916				
917				
918				
919				
920				
921				

Boquillas Canyon - 1991

922		
923	1	1
924		
925		
926		
927	1	1
928	1	1
929	1	1
930		
1001	1	1
1002		
1003		
1004	1	1
1005	2	2
1006		
1007	1	1
1008		
1009		
1010		
1011		
1012		
1013		
1014	1	1
1015		
1016		
1017	1	1
1018	1	1
1019		
1020		
1021		
1022		
1023		
1024		
1025	1	1
1026	1	1
1027	2	2
1028		
1029	1	1
1030		
1031		
1101		
1102		
1103		
1104	1	1
1105		
1106		
1107		
1108		
1109		
1110	1	1
1111	1	1
1112	1	1
1113		
1114		

Boquillas Canyon - 1991

1115			
1116			
1117		1	1
1118			
1119			
1120			
1121			
1122			
1123		1	1
1124		1	1
1125		1	1
1126		1	1
1127	3	3	3
1128	6	6	6
1129			
1130			
1201			
1202			
1203			
1204			
1205			
1206			
1207			
1208			
1209			
1210			
1211			
1212			
1213			
1214		1	1
1215			
1216			
1217			
1218			
1219			
1220			
1221			
1222			
1223			
1224		1	1
1225			
1226			
1227		1	1
1228			
1229			
1230			
1231			

BOQUILLAS CANYON
1992

Date	Comm. Over	Pri. Over	Total Overnight	Comm. Day	Pri. Day	Total Day-Use	Total
101			1				1
102							
103							
104			1				1
105							
106							
107							
108							
109							
110							
111							
112			1				1
113							
114							
115							
116							
117							
118							
119							
120							
121			1				1
122							
123							
124							1
125							
126							
127							
128							
129							
130							
131							
201							
202							
203							
204			1				1
205							
206							
207							
208			1				1
209							
210							
211							
212							
213							
214							
215			3				3
216							
217							

Boquillas Canyon - 1992

218			1			1
219						
220						
221						
222						
223						
224			1			1
225						
226						
227						
228						
229			1			1
301						
302						
303						
304						
305						
306		2	2			2
307		2	2			2
308						
309						
310		2	2			2
311		2	2			2
312		2	2			2
313		2	2			2
314		6	6			6
315	2	12	14			14
316		4	4			4
317	2	3	5			5
318		2	2			2
319	2		2			2
320	1	2	3	1	1	4
321						
322		8	8			8
323		3	3			3
324		1	1			1
325		5	5			5
326		3	3			3
327		1	1			1
328						
329		1	1			1
330						
331						
401						
402						
403		1	1			1
404		1	1			1
405						
406						
407						
408	1		1			1
409		3	3			3
410		9	9			9
411						

Boquillas Canyon - 1992

412	3	3	3
413			
414	1	1	1
415			
416			
417		5	5
418		1	1
419			
420			
421			
422		1	1
423		1	1
424		2	2
425		2	2
426		2	2
427			
428		2	2
429		2	2
430			
501			
502			
503			
504		2	2
505			
506		2	2
507		3	3
508			
509			
510			
511			
512			
513			
514		2	2
515		1	1
516		3	3
517		2	2
518			
519		2	2
520			
521			
522			
523			
524			
525	2	2	2
526			
527			
528			
529			
530			
531			
601			
602			
603			
604		2	2

Boquillas Canyon - 1992

605		
606		
607	2	2
608		
609		
610	2	2
611		
612		
613	2	2
614		
615		
616		
617		
618		
619		
620		
621		
622		
623		
624		
625		
626		
627	2	2
628		
629		
630		
701		
702	2	2
703	1	1
704		
705		
706		
707		
708		
709		
710		
711		
712		
713		
714		
715	1	1
716	1	1
717	1	1
718		
719		
720	1	1
721		
722		
723	1	1
724		
725		
726		
727		
728		

Boquillas Canyon - 1992

729		
730		
731		
801		
802		
803		
804	1	1
805	1	1
806		
807		
808		
809		
810		
811	1	1
812		
813		
814	1	1
815		
816		
817		
818		
819		
820		
821		
822		
823		
824		
825		
826		
827		
828		
829		
830		
831		
901	1	1
902		
903	1	1
904	1	1
905	2	2
906		
907		
908		
909		
910		
911		
912		
913		
914		
915		
916		
917		
918		
919		
920		

Boquillas Canyon - 1992

921		
922		
923		
924		
925	1	1
926		
927		
928		
929		
930	1	1
1001		
1002		
1003		
1004		
1005	1	1
1006		
1007		
1008		
1009		
1010		
1011		
1012		
1013		
1014	1	1
1015		
1016		
1017		
1018		
1019	1	1
1020	1	1
1021	1	1
1022		
1023	1	1
1024		
1025	1	1
1026		
1027		
1028		
1029		
1030		
1031	1	1
1101		
1102	1	1
1103		
1104		
1105		
1106		
1107		
1108		
1109	1	1
1110	1	1
1111		
1112		
1113		

Boquillas Canyon - 1992

1114					
1115					
1116					
1117					
1118					
1119					
1120					
1121					
1122					
1123					
1124			2		2
1125		1	1		1
1126		6	6		6
1127	1		1		1
1128					
1129					
1130					
1201					
1202			1		1
1203					
1204					
1205					
1206					
1207					
1208					
1209					
1210			1		1
1211					
1212					
1213					
1214					
1215					
1216					
1217					
1218					
1219			1		1
1220					
1221					
1222					
1223					
1224					
1225					
1226					
1227					
1228					
1229					
1230					
1231					

Appendix 4. Control Charts

RIVER USE AREA CONTROL CHART PAGE 1 OF 4

MONTH: _____ YEAR: _____

Record # of people in each launch on each day

SEGMENT NAME	CODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTALS
UPPER PARK BOUNDARY TO SANTA ELENA TAKEOUT	101																																
	T01	1																															
	T01	2																															
	T01	3																															
30 PEOPLE PER LAUNCH MAX.	T01	4																															
	101	5																															
	T01	USE																															
SANTA ELENA TAKEOUT TO COTTONWOOD CAMPGROUND	102																																
	T02	2																															
	T02	3																															
30 PEOPLE PER LAUNCH MAX.	T02	4																															
	T02	5																															
NO OVERNIGHT CAMPING	T02	6																															
	T02	7																															
	T02	8																															
	T02	9																															
	T02	10																															
	T02	11																															
	T02	12																															
	T02	TOTAL USE																															

Control Charts

RIVER USE AREA CONTROL CHART PAGE 2 OF 4

MONTH: _____ YEAR: _____

Record # of people in each launch on each day

SEGMENT NAME	CODE	LAUNCH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTALS
COTTONWOOD CAMPGROUND TO REED CAMP	103	TRIBUTARY																																
	103	2																																
30 PEOPLE PER LAUNCH MAX.	103	3																																
	103	4																																
	103	5																																
	103	6																																
	103	7																																
	103	8																																
	103	1	SPECIAL USE LAUNCH																															
REED CAMP TO TALLEY	101	TRIBUTARY LAUNCH																																
	101	2																																
20 PEOPLE PER LAUNCH MAX.	101	3																																
	101	1	SPECIAL USE LAUNCH 1 per week																															
NO MOTORS																																		
1 SPECIAL USE LAUNCH PER WEEK																																		

Control Charts

RIVER USE AREA CONTROL CHART PAGE 3 OF 4

MONTH: _____ YEAR: _____

Record # of people in each launch on each day

SEGMENT NAME	DATE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTALS
TALLEY TO SOLIS	T02	1																															
20 PEOPLE PER LAUNCH MAX.	T02	2																															
NO MOTORS 1 SPECIAL USE LAUNCH PER WEEK	T02	3																															
	T02	1 per wk																															
SOLIS TO LA CLOCHA	T04	1																															
30 PEOPLE PER LAUNCH MAX.	T04	2																															
	T04	3																															
	T04	4																															
	T04	5																															
	T04	6																															
	T04	7																															
	T04	8																															
	T04	1																															

Control Charts

RIVER USE AREA CONTROL CHART PAGE 4 OF 4

Record # of people in each launch on each day

SEGMENT NAME	CODE	LAUNCH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTALS
LA GLORIA TO BOQUILLAS CANYON	105	1																																
	105	2																																
30 PEOPLE PER LAUNCH MAX.	105	3																																
	105	4																																
NO OVERNIGHT CAMPING	105	5																																
	105	6																																
	105	7																																
	105	8																																
	105	9																																
	105	10																																
	105	11																																
	105	12																																
	105	SPECIAL USE																																
BOQUILLAS CANYON TO LOWER PARK BOUNDARY	101	LAUNCH																																
	101	1																																
	101	2																																
	101	3																																
20 PEOPLE PER LAUNCH MAX.	101	SPECIAL USE (per week)																																

NO MOTORS

BIBLIOGRAPHY

American Rivers, 1993. The Nation's Ten Most Endangered Rivers and Fifteen Most Threatened Rivers for 1993. Washington, D.C.

Carranza, C.M., Carias, M. del C. Monarrez, M. Tarango, W. P. Mackay, R. Mena, N. Hallerud, and E. Ruiloba, Jr. 1994. Evaluation of Water Quality of the Rio Grande in Big Bend National Park, Texas, 43 pp. (unpublished report).

Detterline, J.L. and W.E. Wilhelm. 1987. Survey of Pathogenic *Naegleria fowleri* and Thermotolerant Amoebas in Federal Recreational Waters. Department of Biology, Memphis State University, Memphis, TN.

Ditton, R.B., D.J. Schmidly, W.J. Boeer, and A.R. Graefe. 1977. A Survey and Analysis of Recreational and Livestock Impact on the Riparian Zone of the Rio Grande in Big Bend National Park IN: Proceedings of a Symposium On River Recreation Management and Research. U.S. Department of Agriculture Forest Service, Minneapolis, MN. pp.256-266.

Fleming, C.M., S.H. Kunkle, and M.D. Flora. 1995. Riparian Wetlands and Visitor Use Management in Big Bend National Park, Texas. U.S. Dept. of Agriculture Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, General Technical Report RM-GTR-272. 6 pp.

Gomez, A.R. 1990. A Most Singular Country, A History of Occupation in the Big Bend. 218 pp.

Hill, R.T. 1901. *Running the Canons of the Rio Grande*, The Century Magazine, Vol. 61, pp. 371-387.

International Boundary and Water Commission (IBWC) (United States and Mexico sections), the National Water Commission of Mexico, and the U.S. Environmental Protection Agency. 1994. Binational Study Regarding the Presence of Toxic Substances in the Rio Grande/Rio Bravo and its Tributaries along the Boundary Portion Between the United States and Mexico. 250 pp.

International Boundary and Water Commission (IBWC) (United States and Mexico sections). 1995. Joint Report of the Principal Engineers Relative to the Second Phase of the Program to Observe for the Presence of Toxic Substances in the Rio Grande/Rio Bravo in its International Reach. 5 pp. plus figures and tables.

Irwin, R.J. 1989. Toxic Chemicals in Fish and Wildlife at Big Bend National Park, Texas. U.S. Fish and Wildlife Service, Ecological Services Field Office, Fort Worth, TX. 36 pp.

National Park Service, 1980a. Environmental Assessment General Development Plan - Rio Grande Wild and Scenic River, Texas, U.S. Department of the Interior, Denver Service Center. September. 75 pp.

National Park Service, 1980. Rio Grande Wild and Scenic River Statement for Management.

National Park Service, 1981. Big Bend National Park General Management Plan. Big Bend National Park, TX. 50 pp.

National Park Service, 1981. Draft Land Acquisition Plan, Rio Grande Wild and Scenic River, Texas.

National Park Service, 1988. Management Policies. U.S. Department of the Interior, National Park Service, Washington, DC.

National Park Service, 1992a. Big Bend National Park Statement for Management. Prepared by Big Bend National Park, TX with assistance from Southwest Regional Office, Santa Fe, NM. 45 pp.

National Park Service, 1992. Visitor Services Project, Big Bend National Park. University of Idaho. Cooperative Park Studies Unit.

Platania, S.P. 1991. The Ichthyofauna of the Rio Grande Drainage, Texas and Mexico, from Boquillas to San Ygnacio. Report to Region 2. U.S. Fish and Wildlife Service, Arlington, TX.

Roberts, J.L. 1987. An Historical Water Quality Analysis of the Rio Grande River from Presidio, Texas, to Dryden, Texas. M.S., thesis, Sul Ross State University, October.

Skiles, R., J. Morlock, G. Simmons, 1988. An Administrative History of the Rio Grande Wild and Scenic River with Focus on Major Concerns and Public Comment. 21 pp.

Stewart, W.P., B.S. Anderson, P.S. Dunfee. 1993. A User Study of the Rio Grande River Corridor in Big Bend National Park. Texas A&M University, College Station, TX. July. 149 pp.

Texas Water Commission. 1992. Regional Assessment of Water Quality in the Rio Grande Basin. GP 92-02. Austin, TX. November.

United States and Mexico. 1993. Agreement between the Government of the United States of America and the Government of United Mexican States Concerning the Establishment of a Border Environment Cooperation Commission and a North American Development Bank. 15 November.

Clemson University
3 1604 011 603 455